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CYPRESS HILLS PROVINCIAL PARK · ALBERTA

VOLUME 2

Alberta
GOVERNMENT OF ALBERTA

DEPARTMENT OF PUBLIC WORKS
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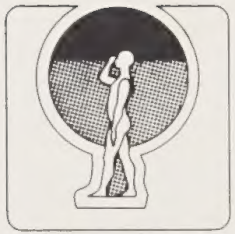

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ANALYSIS

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CYPRESS HILLS PROVINCIAL PARK · ALBERTA

VOLUME 2

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PROLOGUE

The objectives of this "Resource Inventory, Analysis, and Conceptual Planning Study" of Alberta's Cypress Hills Provincial Park were twofold: (1) to document the diverse resources, land-uses, and facilities of the Park, and (2) to make recommendations for (a) upgrading the Park, emphasizing a nature-oriented and interpretive focus, in line with current Provincial Parks policy, and (b) reconciling current multiple land-use conflicts.

In effecting these objectives large amounts of data were generated and are presented in three separate volumes: Resource Inventory, Analysis, and Conceptual Planning.

Resource Inventory

This volume provides inventories and descriptions of the various physical, biological, and cultural resources of Cypress Hills Provincial Park. Other major topics considered in Volume 1 include facilities, user demand, land ownership and parks policy.

The Resource Inventory document represents the refined data bank used in the analysis and conceptual planning phases of this project. It will serve, in future, as a standard reference on the resources of the Park.

Analysis

The analysis document, Volume 2, represents the conversion of hand mapped inventory data into computer format maps. The digitized data were then used to derive the ecological zones map. The entire park area was analyzed according to suitability for and potential impact of future facilities such as roads, trails, campgrounds and picnic sites. Finally, existing facilities were evaluated according to the two categories of suitability and impact.

Conceptual Planning

Results of the conceptual planning phase of this study are presented in Volume 3. The principal findings of the inventory and analysis phases are summarized and their implications in conceptual planning are evaluated. The most significant "activity zones" of the Park are identified and analyzed in greater depth than in the other volumes. Volume 3 also includes recommendations pertaining to the development of appropriate activities, facilities, and circulation within the context of park policy, and a rational phasing schedule.

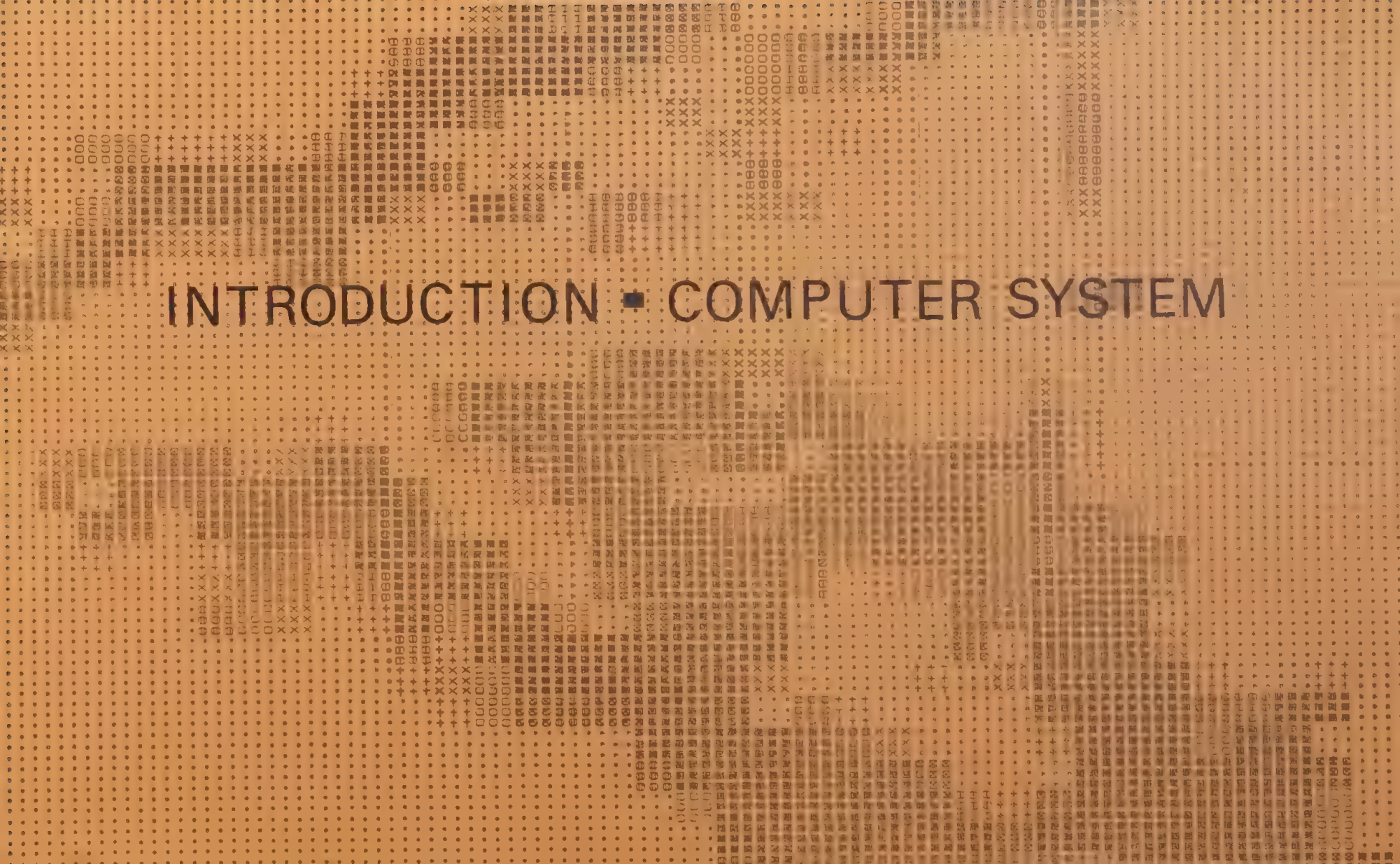
●TABLE OF CONTENTS

TABLE OF CONTENTS

	Page
INTRODUCTION	1
Objectives	1
Value of Computer-Assisted Analysis Approach	1
Acknowledgements	2
The Study Team	2
COMPUTER SYSTEM	
Description of Computer Programs	2
Data Inventory	2
Grid System	2
Cell Size	3
Data Assembly/Co-ordinate Digitizer	3
Study Process Diagram	4
Data Variable Listing	5
Predominant Type Coding	9
Inventory Data Maps	
First Generation Data Maps	13
Second Generation Data Maps (Modelled)	75
ECOLOGICAL ZONING	81
Zoning Unit Selection	82
Zoning Evaluation Criteria	82
Diversity	82
Ecological Uniqueness	82
Undisturbed Character	82
Computer-Assisted Evaluation	83
Weighting the Variables	83
Computer Evaluation Mapping	84
Diversity Maps	85
Uniqueness Maps	91
Undisturbed Character Maps	97
Ecological Zones	103
Determination of Zones	103
Ecological Zoning Plan	103
SUITABILITY AND IMPACT ANALYSIS	
Data Analysis Modelling	107
Matrix Format	107
Use of Analysis Mapping	107
Suitability Evaluation	108
Suitability Criteria	109
Suitability Models	
Model 1 - Roads and Trails	110
Model 2 - Camping and Picnic Sites	111
Matrix Forms (Suitability)	112
Suitability Maps	126
Impact Evaluation	138
Impact Criteria	139
Impact Models	
Model 3 - Roads and Trails	140
Model 4 - Camping and Picnic Sites	141
Matrix Forms (Impact)	142
Impact Maps	155
FACILITIES EVALUATION	167
Suitability of Existing Facilities	167
Potential Impact of Existing Facilities	168
APPENDIX 1 - Gradicon Co-ordinate Digitizer	170

LIST OF TABLES

	Page
Table 1 - Evaluation of Ecological Zones	104
Table 2 - Diversity	105


INTRODUCTION • COMPUTER SYSTEM

INTRODUCTION

The decision to employ a computer-assisted analysis procedure was made at the on-set of the study. To a certain extent this decision affected the form and manner in which much of the inventory information was gathered. Specifically in collecting inventory data, there was no need to be highly selective, since virtually any volume of information could be manipulated.

The term computer-assisted analysis is used deliberately, since phases of the analysis portion of the study employed visual and/or manual analysis techniques. In certain instances the interpretation and comparison of mapped information could be more rapidly accomplished visually.

In order to appreciate fully the reasons for the analysis approach taken and the weightings attached to the variables, a review of the inventory document is essential.

In addition, it is assumed that the reader has some knowledge of basic environmental planning procedures. In that sense it is a technical document. The overly technical aspects however, and specific data required for continuing use of this analysis system, have been reserved for the appendix document.

Objectives

There were a number of objectives specific to the analysis section of the Cypress Hills Planning Study. This phase of the study was concerned with the following:

1) To reshape inventory data presented in Volume 1 of this report into computer form. That is to generate computer duplicates of basic inventory maps.

2) To generate a conceptual ecological zoning plan on the basis of certain ecological characteristics.

3) By using the computer to examine all areas of the Park and its immediate surroundings to determine the most suitable locations for the present range of facilities and uses.

4) To examine all of the areas deemed suitable for various facilities or uses, and determine where high impacts might result.

5) To evaluate present Park facilities in order to determine if and where facilities are poorly sited in terms of suitability and/or impact.

Value of Computer-Assisted Analysis System

Of the many analysis methodologies which might have been employed, the computer-assisted approach was considered the most appropriate for the following reasons:

1) The very diverse resource information base which had to be dealt with was thought to be too complex for traditional hand overlay analysis procedures.

2) A wide variety of uses, many having different resource requirements, had to be compared to the resource base information. The variety of possible uses increases the complexity of the analysis program.

3) No firm planning constraints were expressed. Therefore, priorities, for example a heavy weighting of certain variables, did not allow one to take a selective view of resource features or uses.

4) It was felt that the computer approach which implies a continuing computer capability would, because of its flexibility, be useful to the Parks Department during the on-going planning process.

5) The computer approach would allow for the modification of analytical methods and enable one to reanalyze any part of the inventory data as required.

Acknowledgements

The co-operation and assistance provided to us by Harold Butchart and Jim Lopushinski at Alberta Department of Public Works was exceptional. We are particularly indebted to Jim who provided valuable assistance with the computer system and programming.

The Study Team

Barry Edwards - environmental planner,

Glen Langford - environmental analyst.

COMPUTER SYSTEM

Description of Computer Programs

Based primarily on past experience we chose to use GRID program as the main software package. This computer program was developed at Harvard University and was written spcifically for application to studies similar in nature to the Cypress Hills Planning Project. One of the major advantages of GRID program is that it is flexible enough to allow for a wide range of analytical hypotheses to be applied to the information collected during the data inventory phase. GRID provides a highly efficient means for the graphic display of large quantities of data (as long as the data is collected on the basis of a rectangular co-ordinate grid system). A fairly substantial range of graphic symbolism and data presentation formats are available, through the various program electives which may be specified. An extensive knowledge of computer programming is not absolutely required when using GRID program, however, it can be helpful during the later analytical stages of the work.

Following the decision to use GRID, the program was purchased by the Alberta Department of Public Works, and was set up at the Government Data Centre in Edmonton.

A second program was also required. This program, called Grid/Merge, made it possible to use the co-ordinate digitizer (a device which will be discussed in Appendix 1) to record the mapped information in a computer compatible format. The digitizer output is used as a base to produce (via the Grid/Merge Program) a data file which the Harvard GRID program can operate upon. The only available alternative is to hand-code all the information and then keypunch the entire data bank. This becomes a labourious and time consuming task when an area the size of the Cypress Hills is involved.

The Data Inventory

Grid System

GRID program requires a data file or "data bank", which is composed of coded information and which is related directly to a co-ordinate gridding system. Many grid systems are in common use. Because of the manner in which the inventory information was collected, the Alberta Section grid system was chosen. Following the establishment of a locational co-ordinate system, a unit cell size for purposes of data collection had to be determined.

Cell Size

A cell of 25.6 acres (that is, 1/5 mile on a side) was thought to be satisfactory for our purposes. This means that the study area was defined as 35 cells by 90 cells, or a total of 3,150 cells.

In view of this relatively large cell size, the bulk of the data was collected on a percentage of area basis. This offers a greater differentiation of characteristics occurring within each cell, although specific location of characteristics is lost. Another advantage of the "percentage of-area" system is that side-by-side spatial relationships as well as overlay spatial relationships of resource features can be more easily determined than by use of predominant type systems.

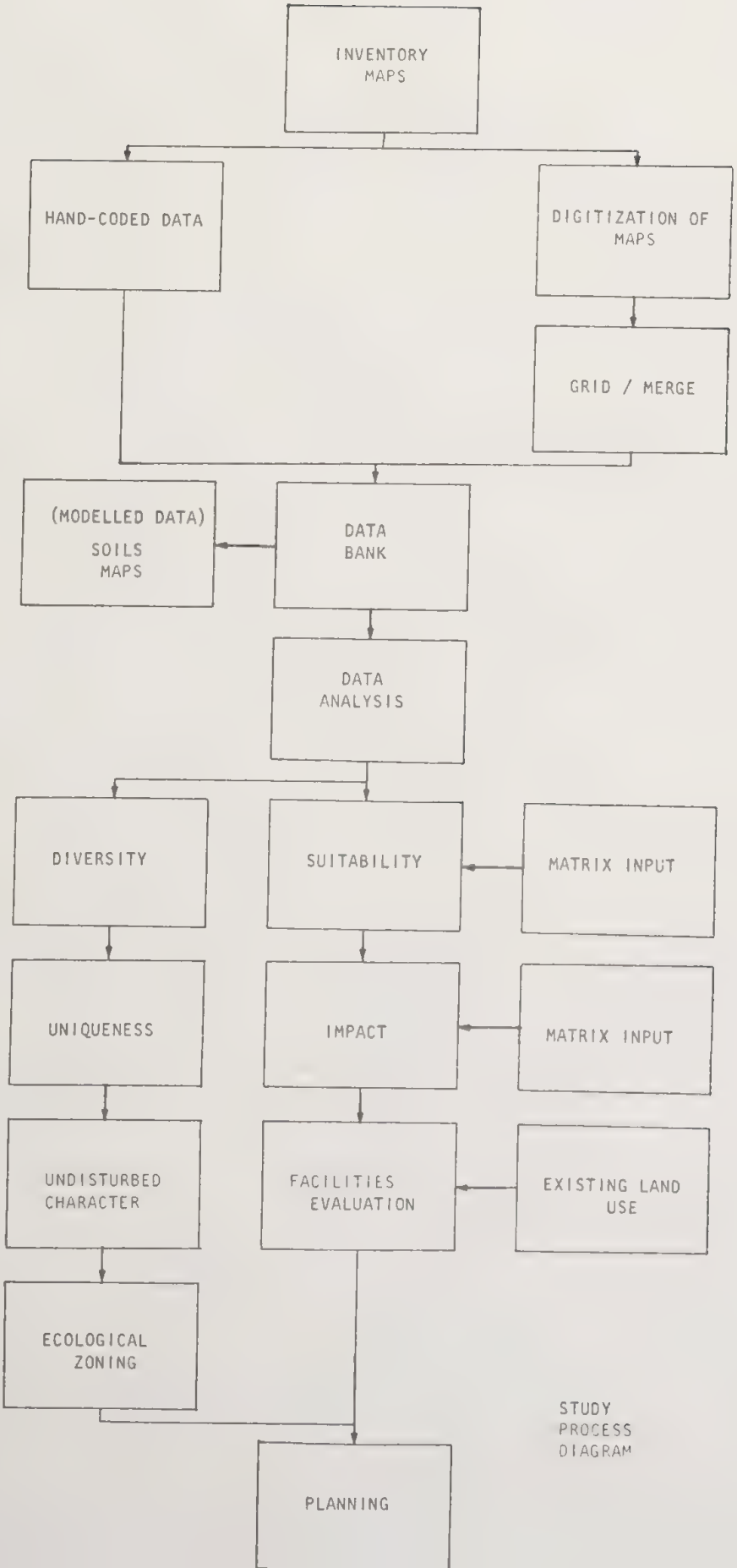
A few of the data variables were recorded on the basis of "predominant type" characteristics. This system of coding is based on the assumption that a particular characteristic is homogenious throughout one cell. The variables recorded as predominant type were generally those to be employed for general overview purposes.

Each data category is recorded on magnetic tape in card image format. In this format, each individual record on the file contains all the information concerning one cell; each group of columns represents a data variable; and the actual value recorded in these columns indicates the percentage of the cell area occupied by that characteristic (or in the case of predominant type, the value represents the predominant characteristic for the cell). The data variable listing on page five indicates the particular card columns and the unique file code assigned to each data variable.

Data Assembly/Co-ordinate Digitizer

Having set all the parameters of the gridding system, a data bank was compiled in a GRID compatible format. A co-ordinate digitizer was employed to transfer the information from the inventory base maps to a computer card file, and eventually to a magnetic tape.

All the maps illustrated in computer form are somewhat distorted. We chose to represent a single cell (25.6 acres) by using an approximate square of three print-characters on a side. The distortion enters into the maps because of the fact that the standard line printer types ten lines per inch in the horizontal direction and only eight lines per inch vertically.



STUDY PROCESS DIAGRAM

DATA VARIABLE LISTING

FLEXIN LOCATOR	DESCRIPTION	VARIABLE #	CARD COL.	FILE CODE
1	Topography: Elevation - Centroid of cell (200' intervals) (PT)	1	1-2	001
2	Topography: Predominant Cell Orientation (PT)	2	3-4	002
3	Topography: % of Area 0 - 2 % Slope	3	5-6	003
4	Topography: % of Area 2 - 5 % Slope	4	7-8	005
5	Topography: % of Area 5 - 10 % Slope	5	9-10	007
6	Topography: % of Area Over 10 % Slope	6	11-12	009
7	Bedrock Geology (PT)	7	13-14	013
8	Surficial Deposits: % of Area - Recent Alluvium	8	15-16	015
9	Surficial Deposits: % of Area - Recent & Pleistocene Eroded Slope (Wooded)	9	17-18	017
10	Surficial Deposits: % of Area - Recent & Pleistocene Colluvium & Alluvial Fan	10	19-20	019
11	Surficial Deposits: % of Area - Pleistocene Glacio-fluvial Meltwater Channel Deposits	11	21-22	021
12	Surficial Deposits: % of Area - Pleistocene Glacio-fluvial Outwash	12	23-24	023
13	Surficial Deposits: % of Area - Pleistocene Glacial Hummocky Morraine	13	25-26	025
14	Surficial Deposits: % of Area - Pleistocene Aeolian loess	14	27-28	027
15	Surficial Deposits: % of Area - Pleistocene Drift, Thin Undifferentiated Pleistocene Deposits	15	29-30	029
16	Landforms (PT)	16	31-32	031
17	Groundwater (PT)	17	33-34	018
18	Surface Water: % of Area Watershed A Bullshead Creek	18	35-36	035
19	Surface Water: % of Area Watershed B Lodge Creek	19	37-38	037

Data Variable Listing continued

FLEXIN LOCATOR	DESCRIPTION	VARIABLE #	CARD COL.	FILE CODE
18	Surface Water: % of Area Watershed C Grosventre Creek	20	39-40	039
18	Surface Water: % of Area Watershed D Sexton Creek	21	41-42	041
18	Surface Water: % of Area Watershed E Read Creek	22	43-44	043
18	Surface Water: % of Area Watershed F Willow Creek	23	45-46	045
18	Surface Water: % of Area Watershed G Elkwater Lake	24	47-48	047
19	Surface Water: % of Area Watershed H Ross Creek	25	49-50	049
19	Surface Water: % of Area Watershed I Spruce Coulee	26	51-52	051
19	Surface Water: % of Area Watershed J Battle Creek	27	53-54	053
19	Surface Water: % of Area Watershed K Mackay Creek	28	55-56	055
19	Surface Water: % of Area Watershed L Graburn Creek	29	57-58	057
19	Surface Water: % of Area Watershed M Storm Creek	30	59-60	059
19	Surface Water: % of Area Watershed N Nine Mile Creek	31	61-62	061
20	Surface Water: (PT)	32	63-64	063
21	Vegetation: Grassland - % of Area Festuca scabrella	33	65-66	065
22	Vegetation: Grassland - % of Area Potentilla fruiticosa	34	67-68	067
23	Vegetation: Grassland - % of Area Stipa spartea	35	69-70	069
24	Vegetation: Grassland - % of Area Agropyron spp.	36	71-72	071
25	Vegetation: Grassland - % of Area Bromus inermus	37	73-74	073
26	Vegetation: Non-Forest - % of Area Fescue Grassland	38	75-76	075
27	Vegetation: Forest - % of Area Mixed Forest	39	77-78	077
28	Vegetation: Forest - % of Area Aspen	40	79-80	079

Data Variable Listing continued

FLEXIN LOCATOR	DESCRIPTION	VARIABLE #	CARD COL.	FILE CODE
29	Vegetation: Forest - % of Area Pine	41	81-82	081
30	Vegetation: Forest - % of Area Spruce	42	83-84	083
31	Vegetation: Non-Forest - % of Area Man controlled	43	85-86	085
32	Vegetation: Non-Forest - % of Area Mixed Grassland	44	87-88	087
33	Vegetation: Non-Forest - % of Area Grassland/Shrubland	45	89-90	089
34	Vegetation: Forest - % of Area Aspen Groveland	46	91-92	091
35	Vegetation: Non-Forest - % of Area Shrubland	47	93-94	093
36	Vegetation: Non-Forest - % of Area Willow/sedge	48	95-96	095
37	Vegetation: Non-Forest - % of Area Marsh/wet meadow	49	97-98	097
38	Vegetation: Non-Forest - % of Area Valley Bottom Grass Shrub	50	99-100	099
39	Vegetation: Non-Forest - % of Area Willow/currant/cow parsnip	51	101-102	101
40	Vegetation: Water Association - % of Area within 100m of standing water, One hectare or larger	52	103-104	103
41	Vegetation: Water Association - % of Area Associated with water body less than One hectar/Permanent standing water bodies flowing only during Spring melt.	53	105-106	105
42	Vegetation: Water Association - % of Area Within 100 m of permanently flowing stream	54	107-108	107
43	Vegetation: Water Association - % of Area Water table at or near the surface only during Spring melt, but within 2m of soil surface during remainder of year	55	109-110	109
44	Vegetation: Grassland - Condition and trend (PT)	56	111-112	111
45	Wildlife: Winter Dist. of Mule and White tailed deer, % of Area	57	113-114	113

Data Variable Listing continued

FLEXIN LOCATOR	DESCRIPTION	VARIABLE #	CARD COL.	FILE CODE
46	Wildlife: Winter Distribution of Elk, % of Area	58	115-116	114
47	Wildlife: Winter Distribution of Moose, % of Area	59	117-118	115
48	Wildlife: Habitat - Birds (PT)	60	119-120	116
49	Wildlife: Habitat - Small mammals, (PT)	61	121-122	117
50	Visual Zones	62	123-124	121
51	Visual Features	63	125-126	123
52	Archaeology: Major & Minor Sites	64	127-128	125
53	Park Roads (PT)	65	129-130	127
54	Park Services (PT)	66	131-132	129
55	Park Facilities (PTP)	67	133-134	131
56	Soil Texture - Coarse % of Area	68	135-136	(modelled)
57	Soil Texture - Medium % of Area	69	137-138	
58	Soil Texture - Fine % of Area	70	139-140	
59	Soil Texture - Fine/Organic % of Area	71	141-142	
60	Soil Texture - Loess % of Area	72	143-144	
61	Forest Density (PT)	73	145-146	
62	Forest Height (PT)	74	147-148	
63	Wild-Habitat Beaver % of Area	75	149-150	117
64	Wild-Habitat Mink % of Area	76	151-152	117
65	Standing H20 % of Area	77	153-154	063
66	Streams % of Area	78	155-156	063

Predominant Type Coding

1. Elevation - Centroid of Cell FC = 001

00 = uncoded
01 = .LT. 3900
02 = 3900 - 4100
03 = 4100 - 4300
04 = 4300 - 4500
05 = 4500 - 4700
06 = .GT. 4700

2. Predominant Cell Orientation FC = 002

00 = uncoded
01 = flat
02 = north
03 = northeast
04 = northwest
05 = east
06 = west
07 = southeast
08 = southwest
09 = south

3. Bedrock Geology FC = 013

00 = uncoded
01 = Cypress Hills Formation
02 = Frenchman Formation
03 = Ravenscrag Formation
04 = Battle Formation
05 = Whitemud Formation
06 = Eastend Formation
07 = Bearpaw Formation

4. Landforms FC = 031

00 = uncoded
01 = plateau
02 = slope/scarp
03 = knob and kettle
04 = meltwater channel
05 = floodplain
06 = outlier
07 = outwash

5. Ground water FC = 018

00 = uncoded
01 = minor recharge (slope)
02 = major aquifer (Eastend Fm.)
03 = minor aquifer (Frenchman Fm.)
04 = major recharge (Plateau)
05 = minor aquifer (Floodplain)
06 = minor aquifer (Meltwater channel)
07 = minor recharge (Spring)
08 = minor recharge (Wells)

6. Surface Water FC = 063

00 = none/uncoded
01 = standing water bodies
02 = major streams

7. Grassland - Condition and Trend FC = 111

00 = none/uncoded
01 = high
02 = medium
03 = low

8. Unique Wildlife Habitat - Birds FC = 116

00 = none/uncoded
01 = Broad-winged hawk
02 = Pied-billed grebe
03 = MacGillivray's warbler
04 = rare nesting species (Grasshopper Sparrow, Merlin)

9. Wildlife Habitat FC = 117

00 = none/uncoded
01 = beaver
02 = mink

10. Visual Zones FC = 121

00 = none/uncoded
01 = slope .GT. 5% (forest)
02 = on the bench (forest)
03 = valley bottom (forest)
04 = on the bench (prairie)
05 = slope .GT. 5% (prairie)
06 = valley bottom (prairie)
07 = built-up area
08 = lake

11. Visual Features (Number of) FC = 123

00 = none/uncoded
01 = 1 positive feature
02 = 2 positive feature
03 = 3 or more positive features
04 = 1 negative feature
05 = 2 negative features
06 = 3 or more negative features
07 = both negative and positive features within cell

12. Archaeology FC = 125

00 = none/uncoded
01 = east battle creek site
02 = south battle creek site
03 = gryba site
04 = willow creek site
05 = kajewski site
06 = minor sites

13. Park Roads FC = 127

00 = none/uncoded
01 = 1 hardsurface road in cell
02 = 2 hardsurface roads in cell
04 = 1 gravel or earth surface road in cell
05 = 2 gravel or earth surface road in cell
07 = cattle gate in cell

14. Park Services FC = 129

00 = none/uncoded
01 = well
02 = watermain
03 = spring (associated with camping use)
04 = storage tank (water)

15. Park Facilities FC = 131

00 = none/uncoded
01 = campground
02 = scenic lookout
03 = fire tower
04 = saw mill
05 = golf course
06 = airstrip

15. continued

07 = picnic area
08 = monument (historic & others)
09 = fishing wharf

16. Forest Height

00 = uncoded
01 = up to 30 feet
02 = 30 to 60 feet
03 = over 60 feet

17. Forest Density

00 = uncoded
01 = sparce
02 = moderate
03 = dense
04 = very dense

Second Generation Data Maps (modelled data)

1. Soil texture model

00 = none/uncoded (or bedrock - no soil)
01 = recent & Pleistocene - eroded slp.
recent & Pleistocene - colluvium and alluvial fan
02 = Pleistocene glacial - hummocky moraine
pleistocene drift
thin undiff. pleistocene deposits
03 = recent alluvium
glaciofluvial meltwater channel
glaciofluvial outwash
04 = vegetation types - marsh/wet meadow
willow/currant/cow parsnip community
willow/sedge
05 = pleistocene aeolian loess

2. Soil Texture

01 = coarse
02 = medium
03 = fine
04 = fine/organic
05 = loess

3. Visual Penetration Model

Forest Density	0	<30'	>30'
None	V.H.		
Sparce		H	H
Moderate		M	M
Dense		L	M
Very Dense		V.L.	L

4. Visual Penetration

00 = none/uncoded
01 = very high
02 = high
03 = moderate
04 = low
05 = very low

LIST OF DATA MAPS

MAP #	DESCRIPTION:
1.	Topography: Elevation - Centroid of cell (200' intervals) (PT)
2.	Topography: Predominant Cell Orientation (PT)
3.	Topography: Per cent of Area 0 - 2 per cent Slope
4.	Topography: Per cent of Area 2 - 5 per cent Slope
5.	Topography: Per cent of Area 5 - 10 per cent Slope
6.	Topography: Per cent of Area over 10 per cent Slope
7.	Bedrock Geology (PT)
8.	Surficial Deposits: Per cent of Area - Recent Alluvium
9.	Surficial Deposits: Per cent of Area - Recent & Pleistocene Eroded Slope (Wooded)
10.	Surficial Deposits: Per cent of Area - Recent & Pleistocene Colluvium & Alluvial Fan
11.	Surficial Deposits: Per cent of Area - Pleistocene Glacio-fluvial, Meltwater Channel Deposits
12.	Surficial Deposits: Per cent of Area - Pleistocene Glacio-fluvial, Outwash
13.	Surfical Deposits: Per cent of Area - Pleistocene Glacial Hummocky Morraine
14.	Surfical Deposits: Per cent of Area - Pleistocene Aeolian loess
15.	Surficial Deposits: Per cent of Area - Pleistocene Drift, Thin Undifferenciated Pleistocene Deposits
16.	Landforms (PT)
17.	Groundwater (PT)
18.	Surface Water: Watersheds - A through G
19.	Surface Water: Watersheds - H through N
20.	Vegetation: Grassland - Per cent of Area, Festuca scabrella
21.	Vegetation: Grassland - Per cent of Area, Potentilla fruiticosa
22.	Vegetation: Grassland - Per cent of Area, Stipa spartea
23.	Vegetation: Grassland - Per cent of Area, Agropyron spp.
24.	Vegetation: Grassland - Per cent of Area, Bromus inermus
25.	Vegetation: Non-Forest - Per cent of Area, Fescue Grassland
26.	Vegetation: Forest - Per cent of Area, Mixed Forest
27.	Vegetation: Forest - Per cent of Area, Aspen

28. Vegetation: Forest - Per cent of Area, Pine

29. Vegetation: Forest - Per cent of Area, Spruce

30. Vegetation: Non-Forest - Per cent of Area, Man controlled

31. Vegetation: Non-Forest - Per cent of Area, Mixed Grassland

32. Vegetation: Non-Forest - Per cent of Area, Grassland/Shrubland

33. Vegetation: Forest - Per cent of Area, Aspen Groveland

34. Vegetation: Non-Forest - Per cent of Area, Shrubland

35. Vegetation: Non-Forest - Per cent of Area, Willow/sedge

36. Vegetation: Non-Forest - Per cent of Area, Marsh/wet meadow

37. Vegetation: Non-Forest - Per cent of Area, Valley Bottom Grass Shrub

38. Vegetation: Non-Forest - Per cent of Area, Willow/currant/cow parsnip

39. Vegetation: Water Association - Per cent of Area, within 100m of standing water, One hectare or larger.

40. Vegetation: Water Association - Per cent of Area, Associated with water body less than One hectar/Permanent standing water bodies flowing only during Spring melt.

41. Vegetation: Water Association - Per cent of Area, within 100m of permanently flowing stream.

42. Vegetation: Water Association - Per cent of Area, Water table at or near the surface only during Spring melt, but within 2m of soil surface during remainder of year.

43. Vegetation: Grassland - Condition and Trend (PT)

44. Wildlife: Winter Distribution of Mule and White-tailed deer, per cent of Area.

45. Wildlife: Winter Distribution of Elk, per cent of Area

46. Wildlife: Winter Distribution of Moose, per cent of Area

47. Wildlife: Habitat - Birds (PT)

48. Visual Zones

49. Visual Features

50. Archaeology: Major and Minor Sites

51. Park Roads (PT)

52. Park Services (PT)

53. Park Facilities (PTP)

54. Forest Density (PT)

55. Forest Height (PT)

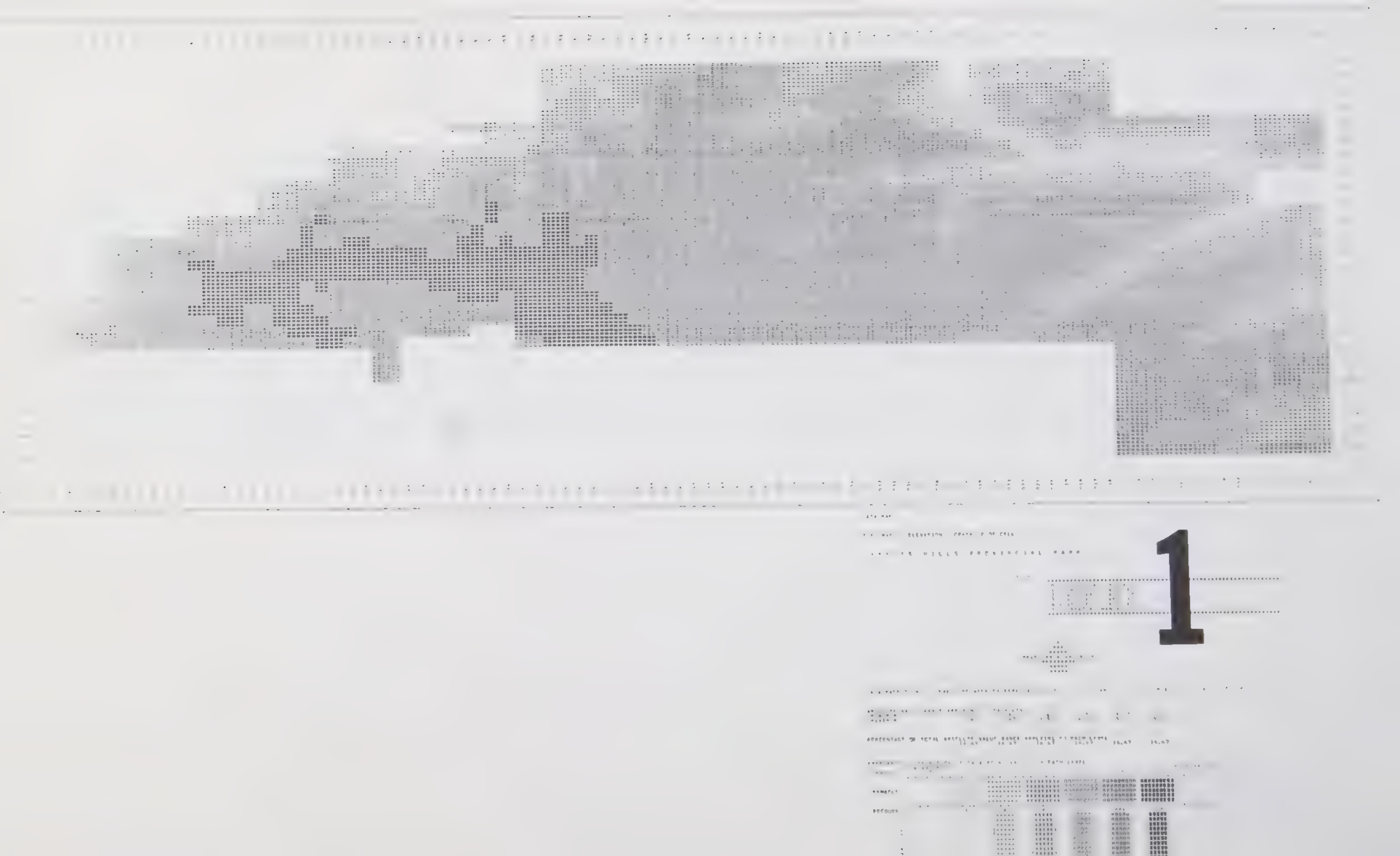
56. Wild-Habitat Beaver, per cent of Area

57. Wild-Habitat Mink, per cent of Area

58. Standing H2O, per cent of Area

59. Streams, per cent of Area

Reference Grid Overlay



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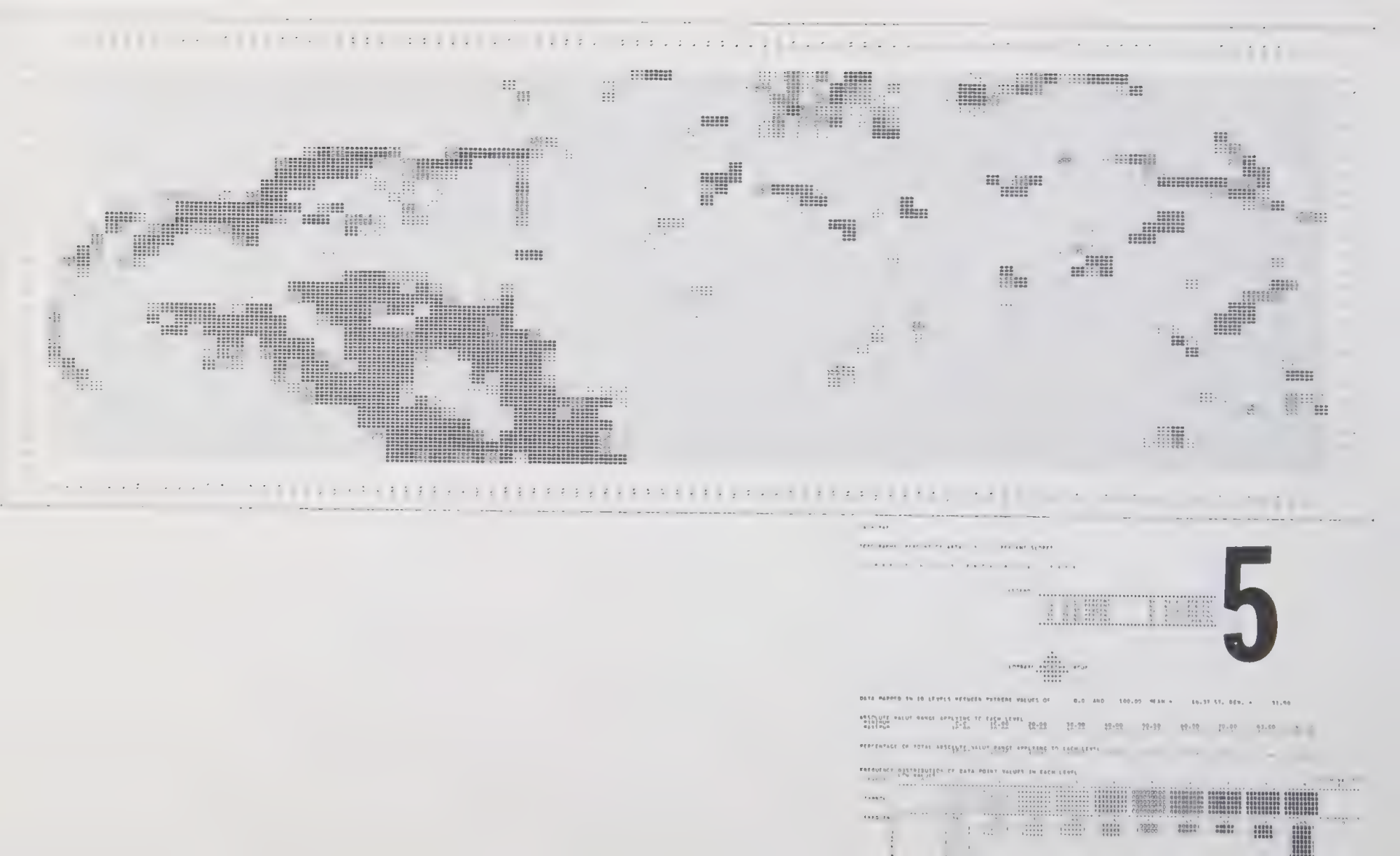

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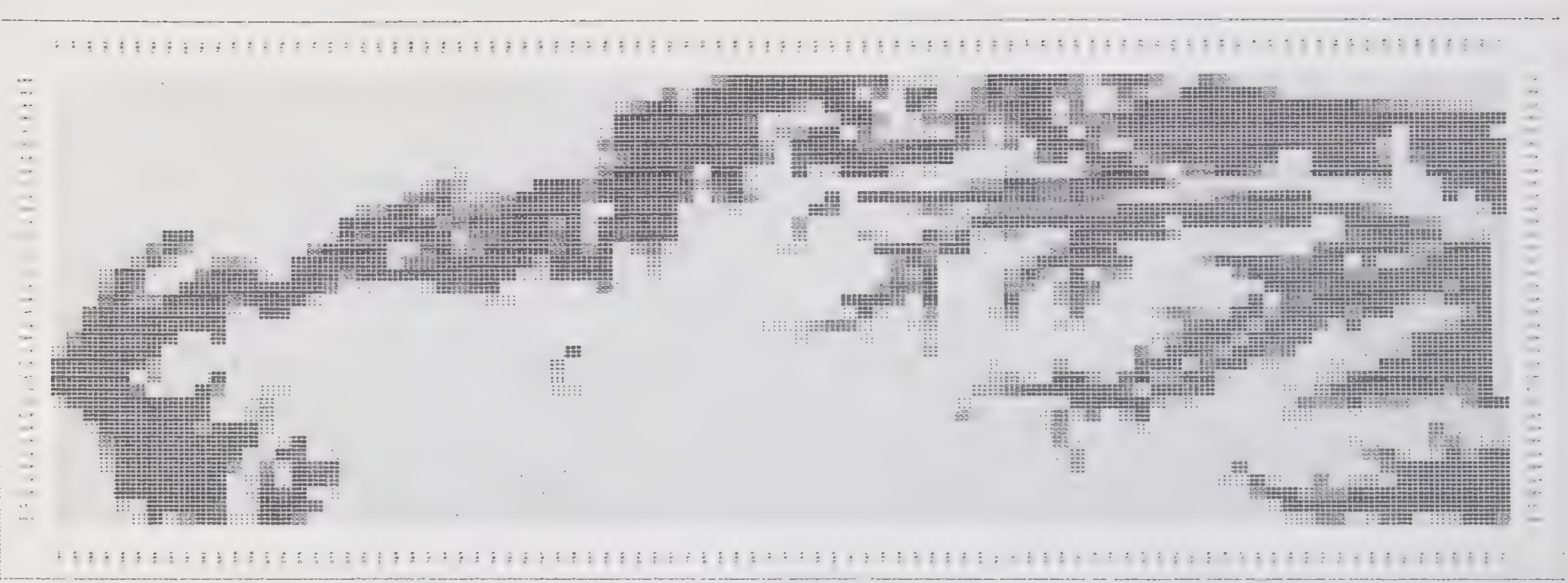

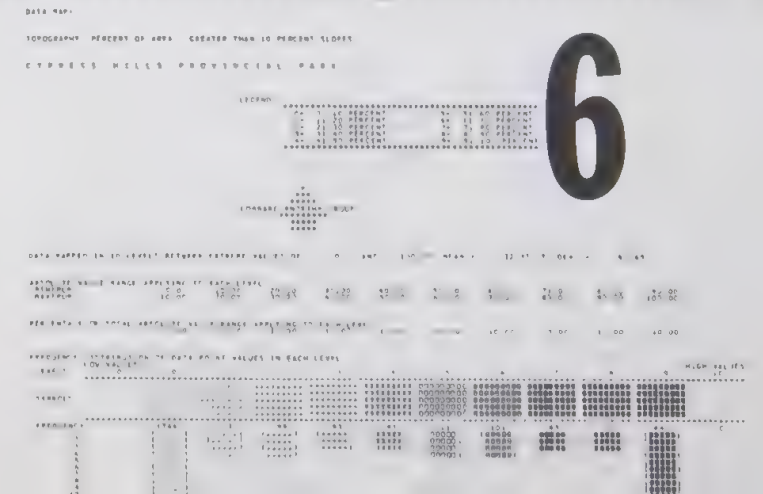
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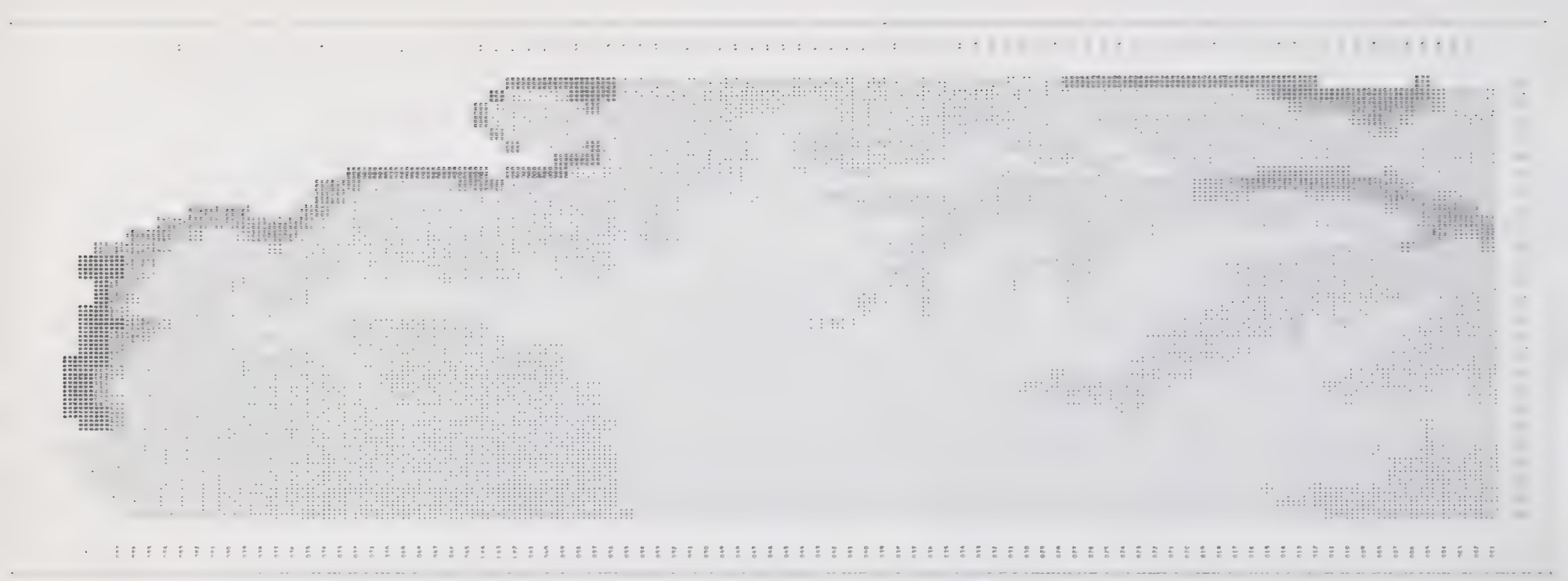

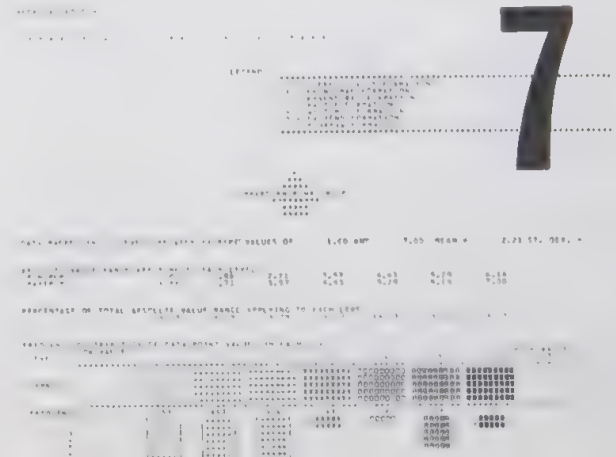

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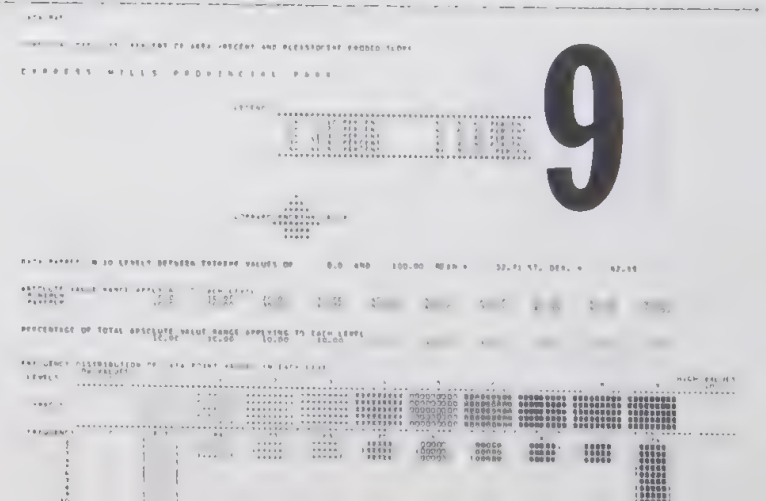
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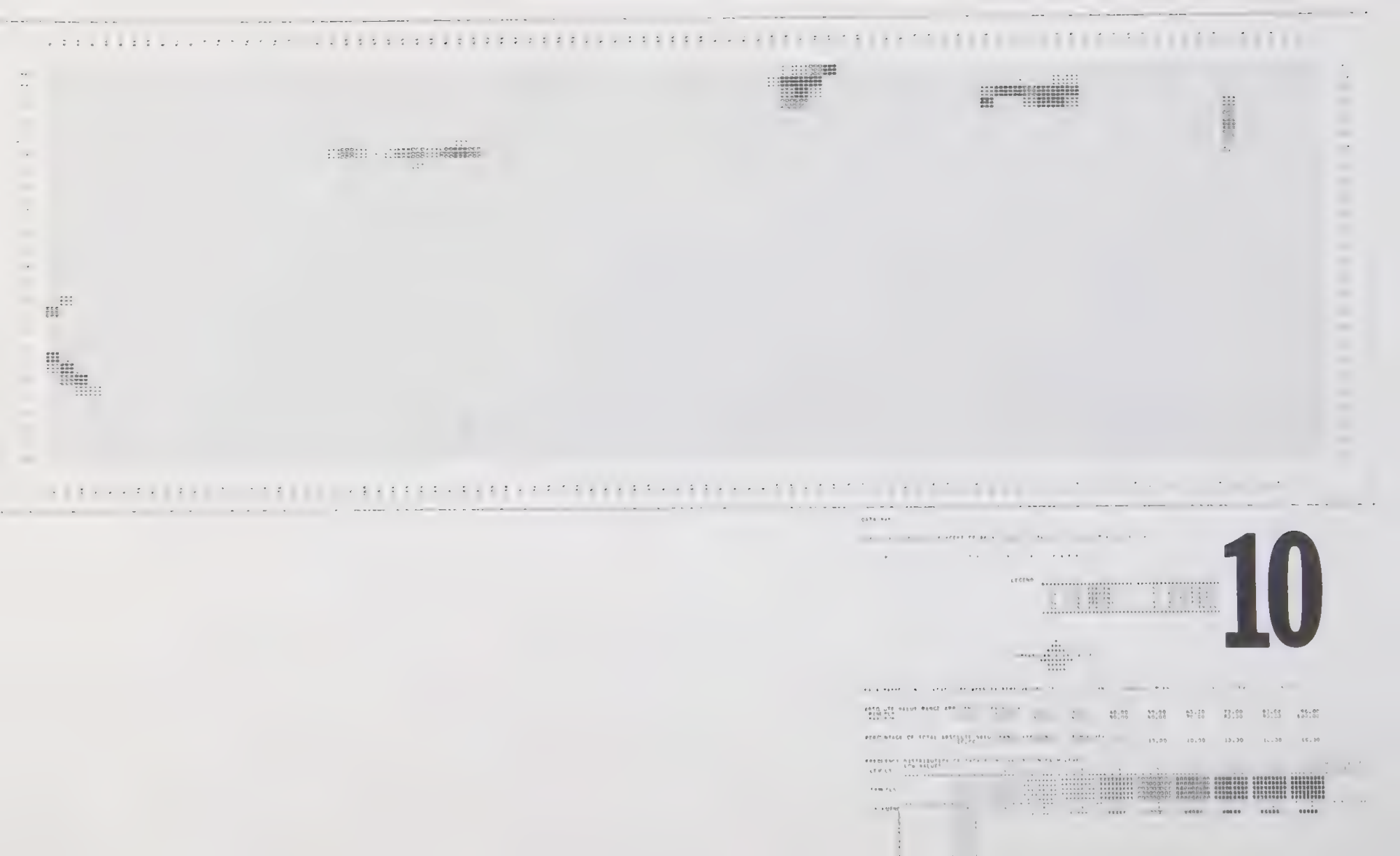
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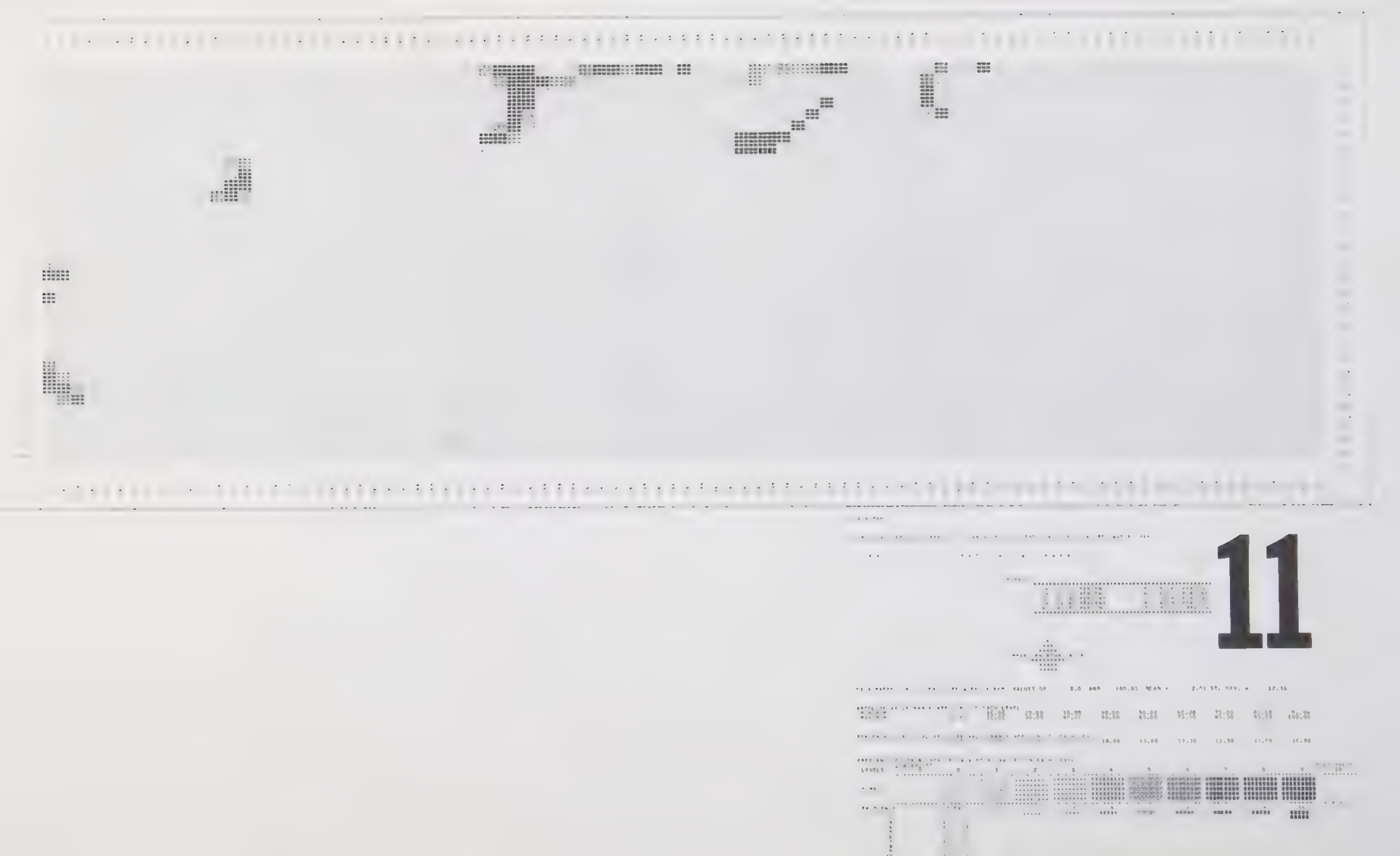

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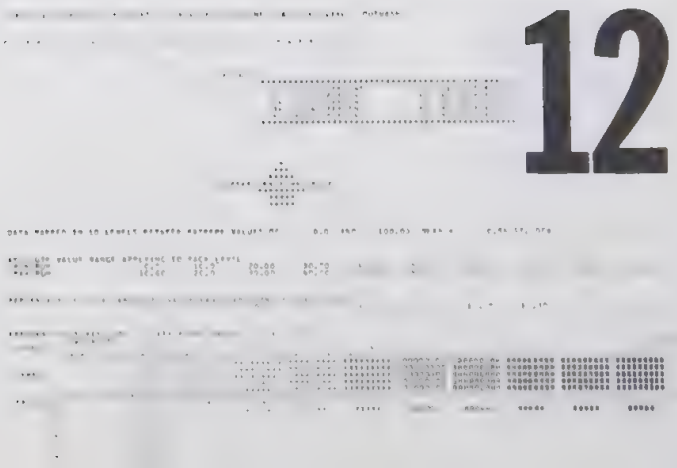

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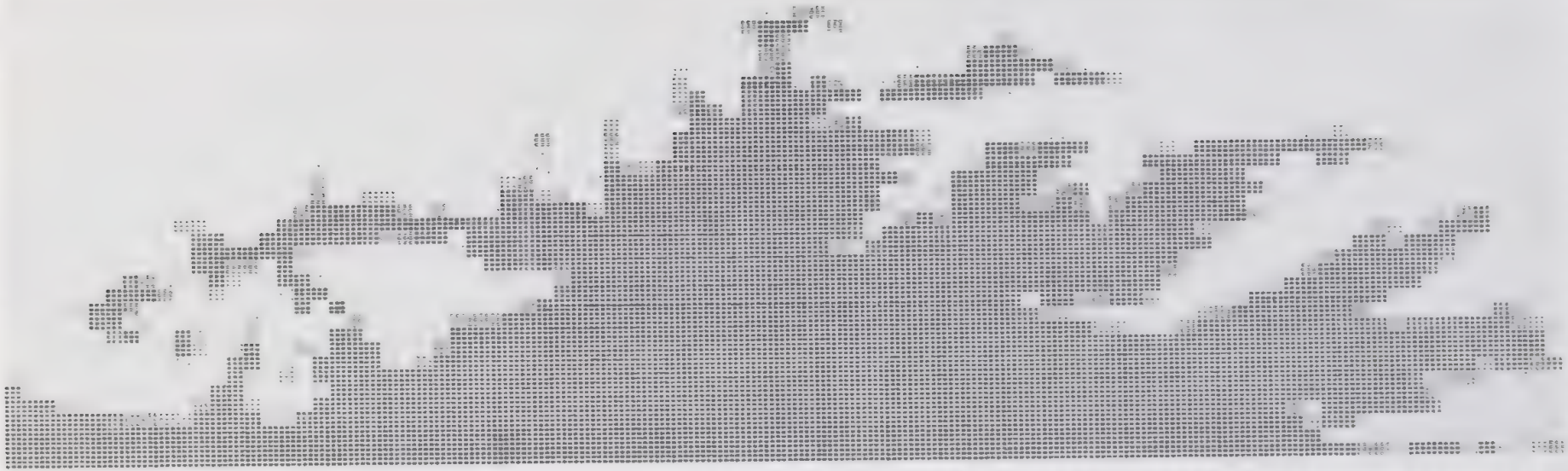

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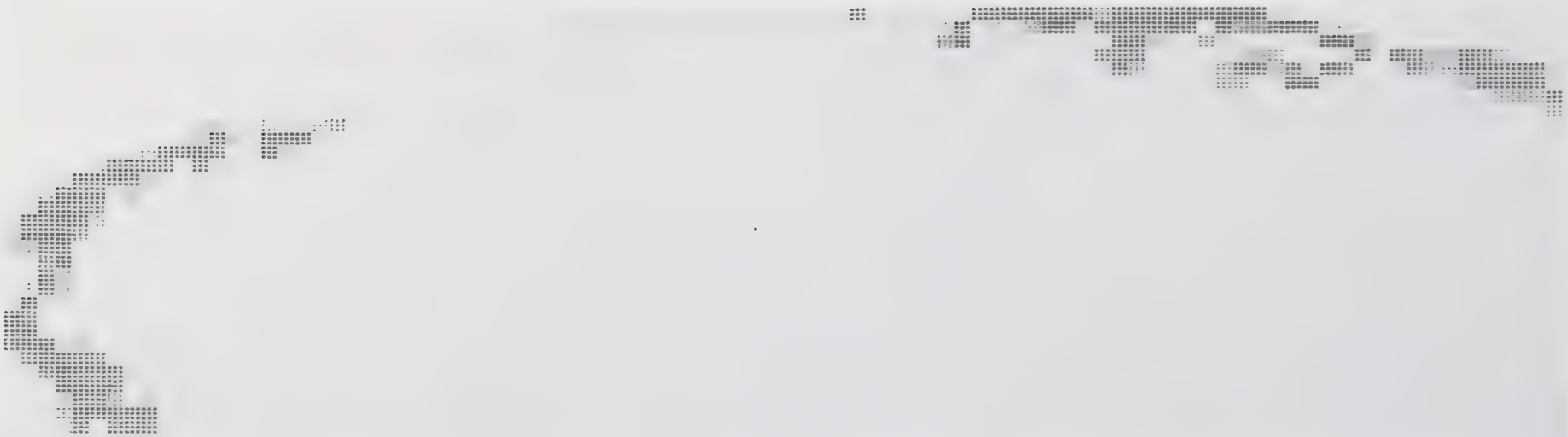

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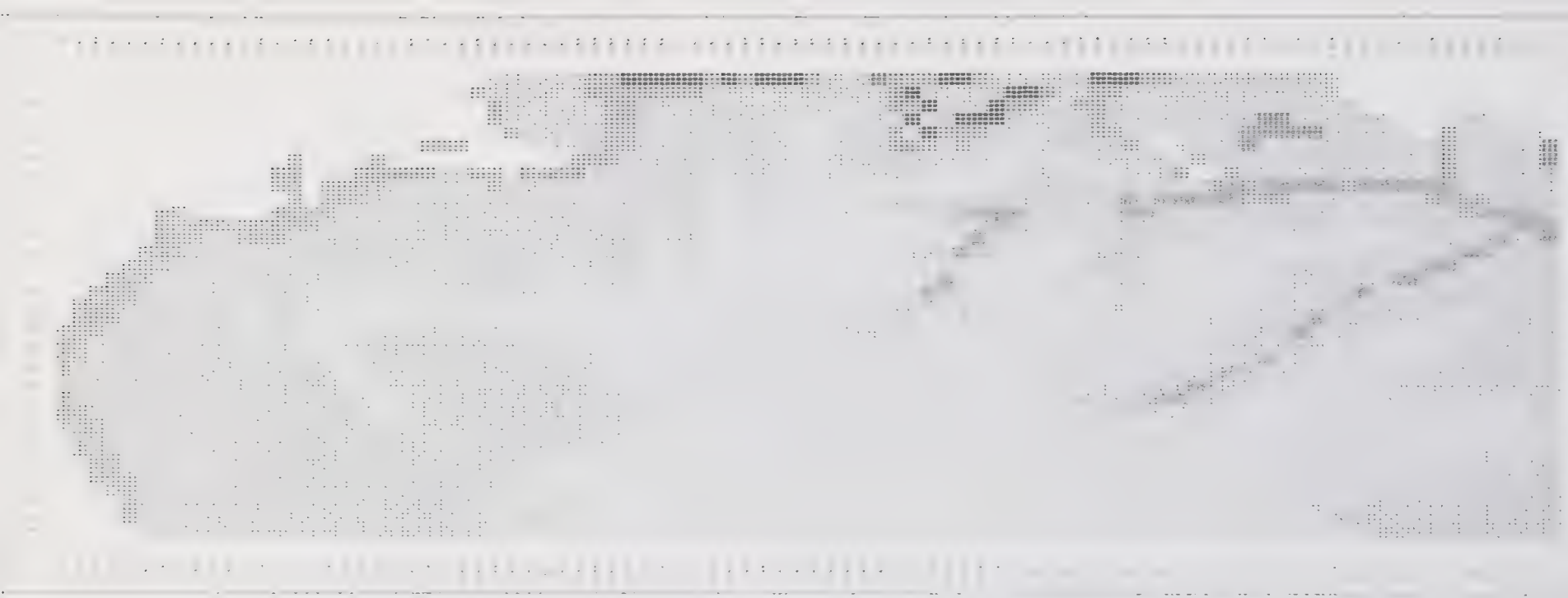

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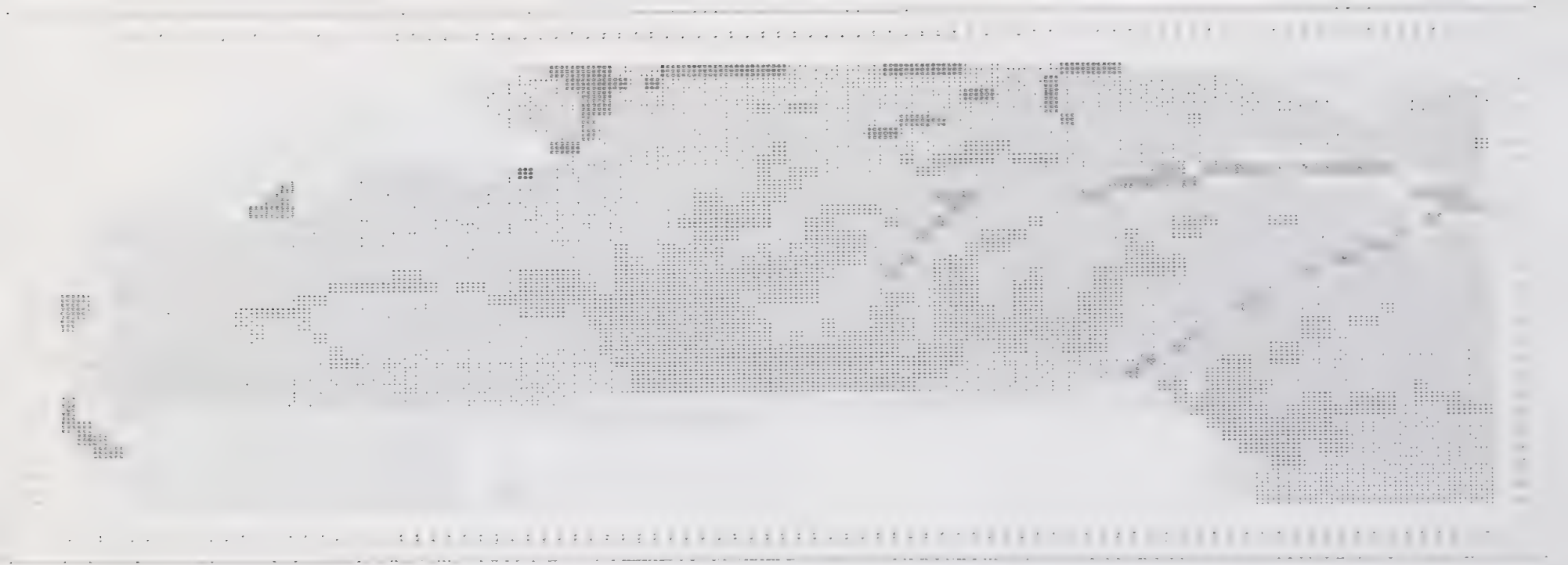

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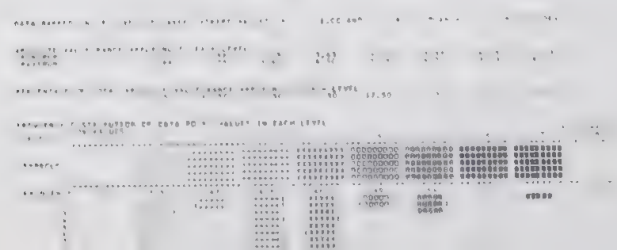

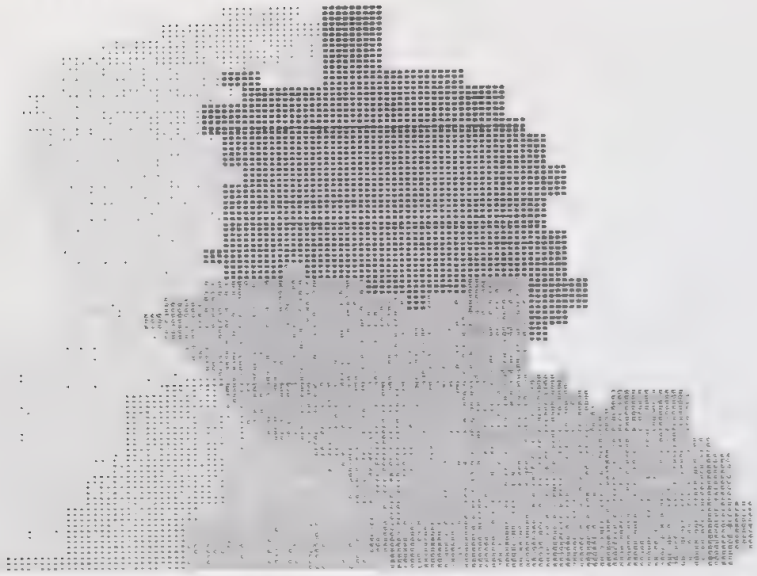

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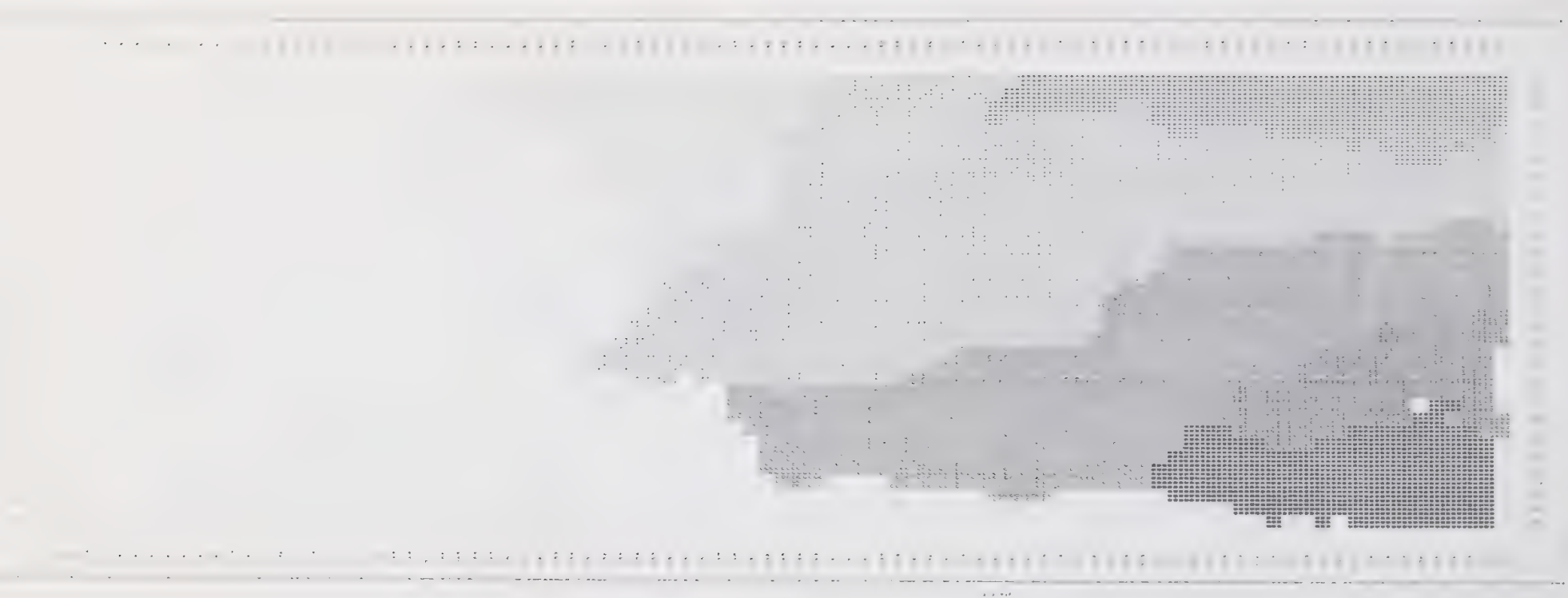

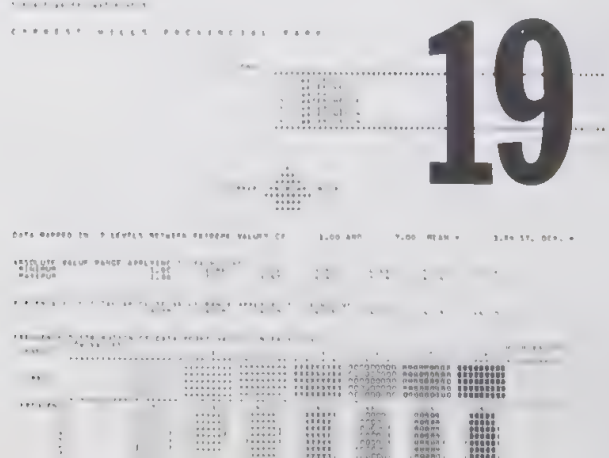

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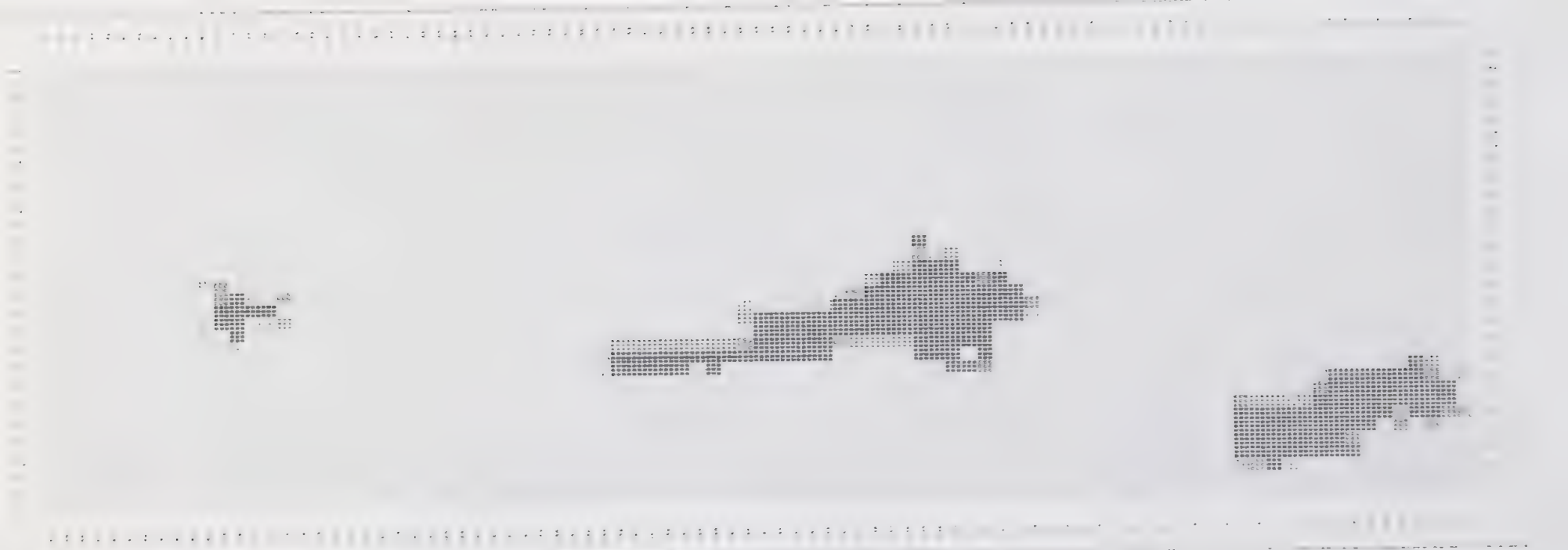

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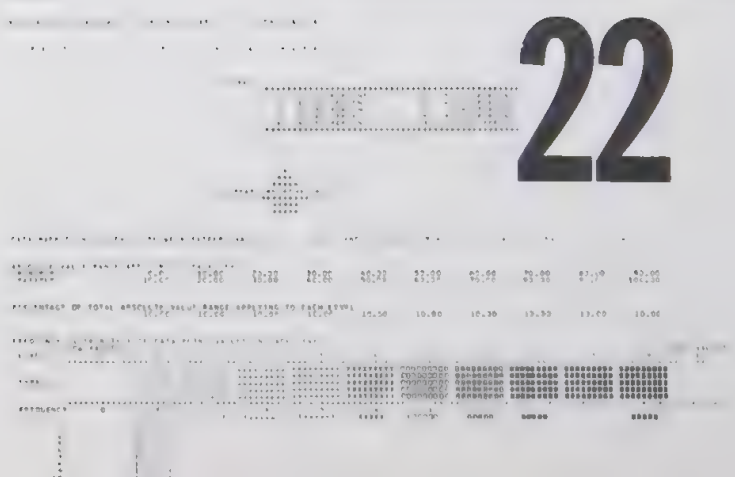

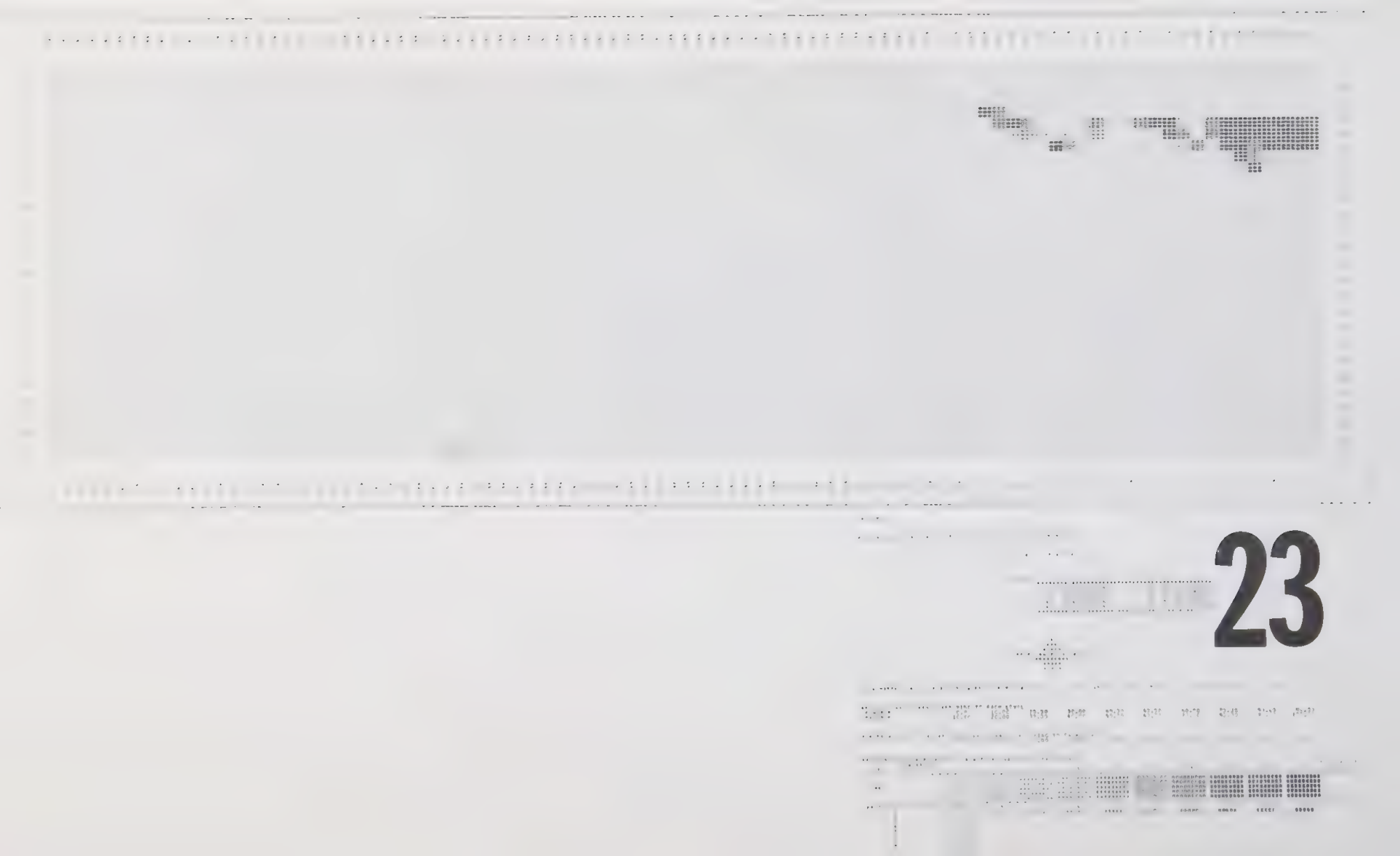

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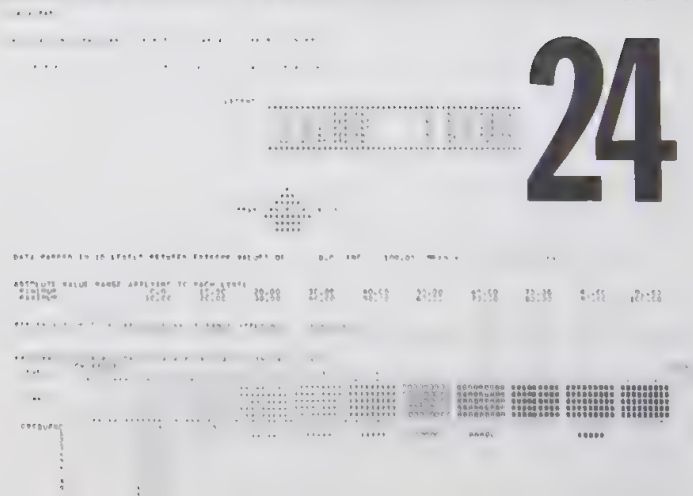

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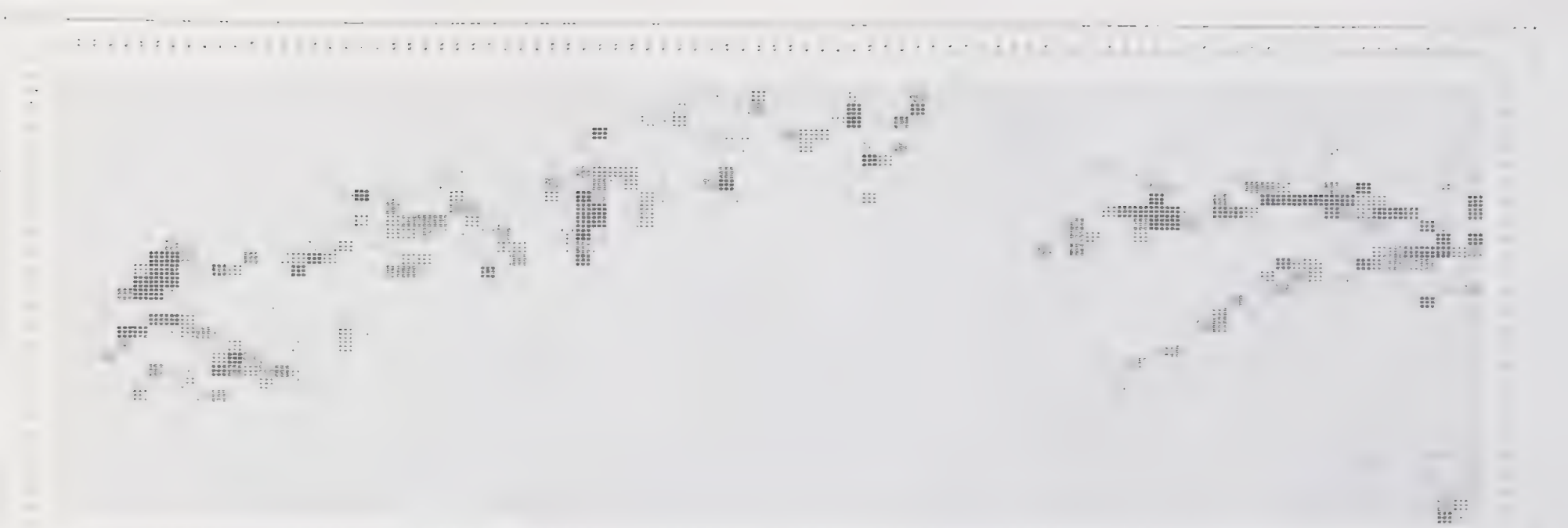

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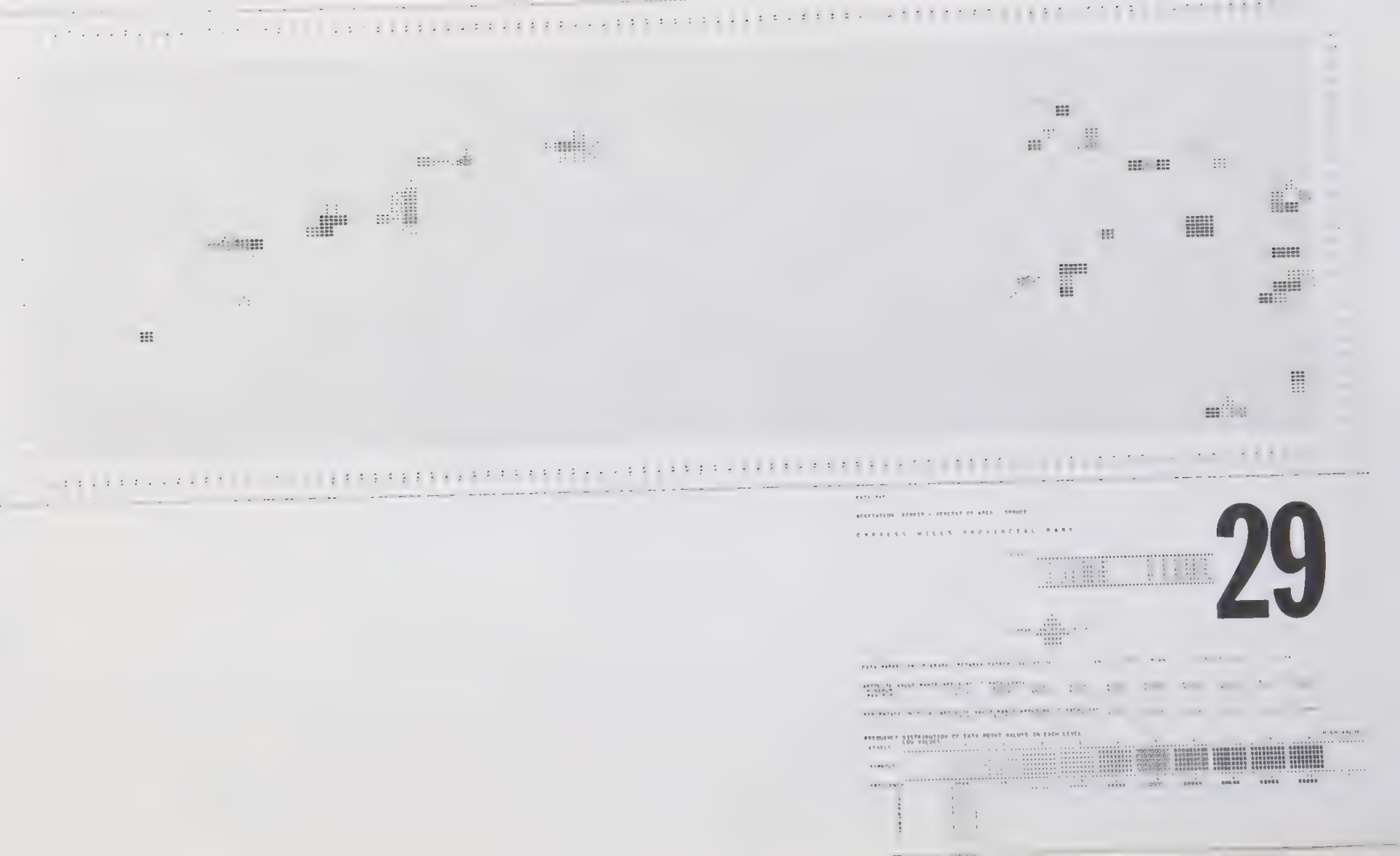


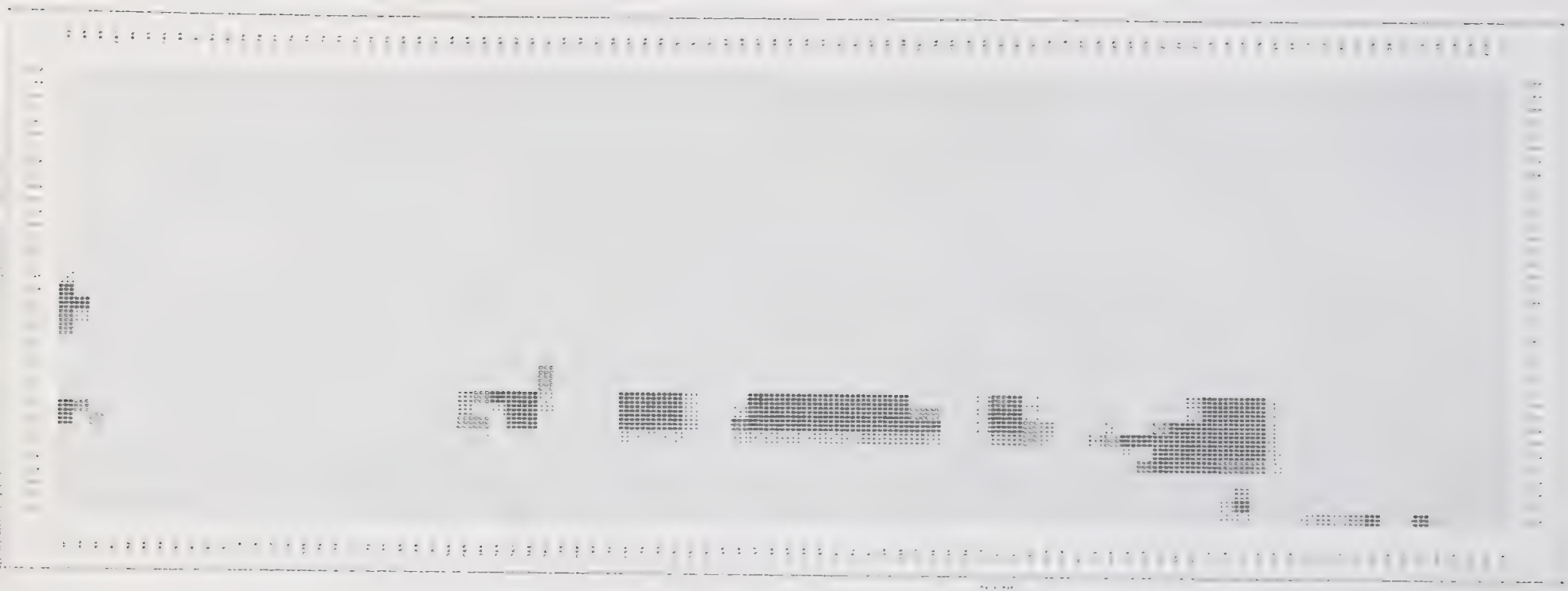
29

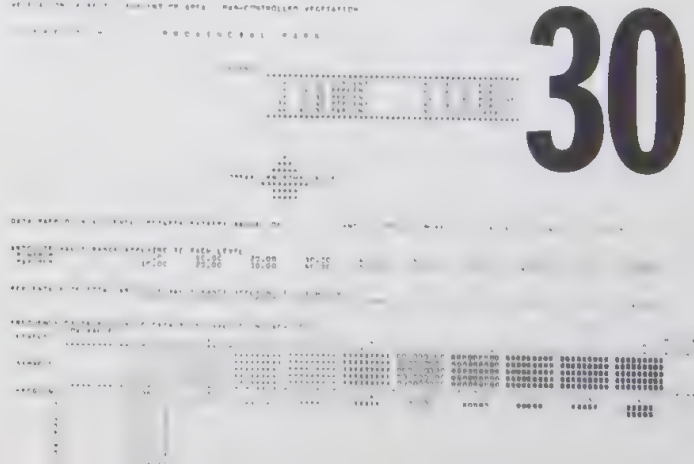
ANALYSIS

CYPRESS HILLS PROVINCIAL PARK ALBERTA

CYPRESS HILLS PROVINCIAL PARK ALBERTA

ANALYSIS





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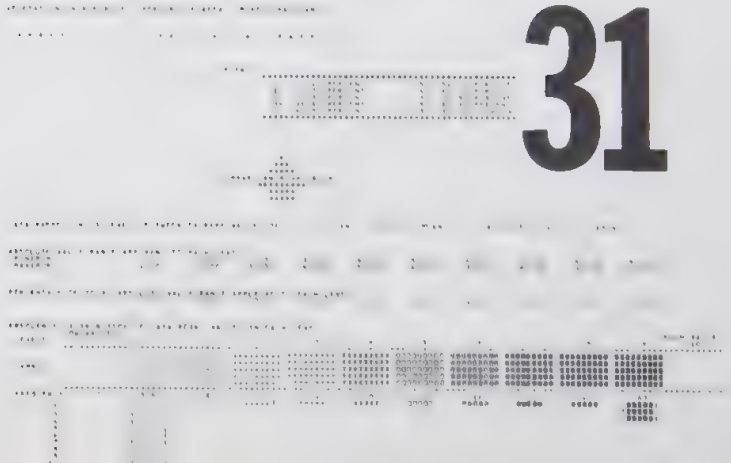

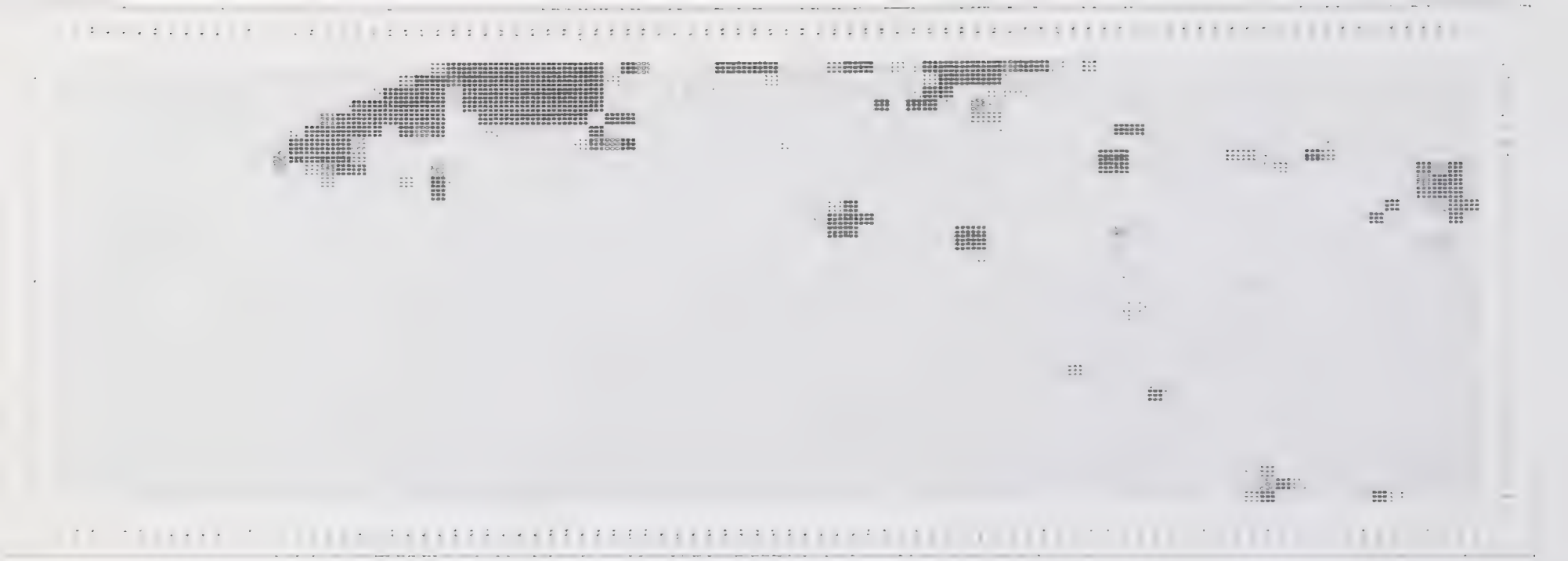

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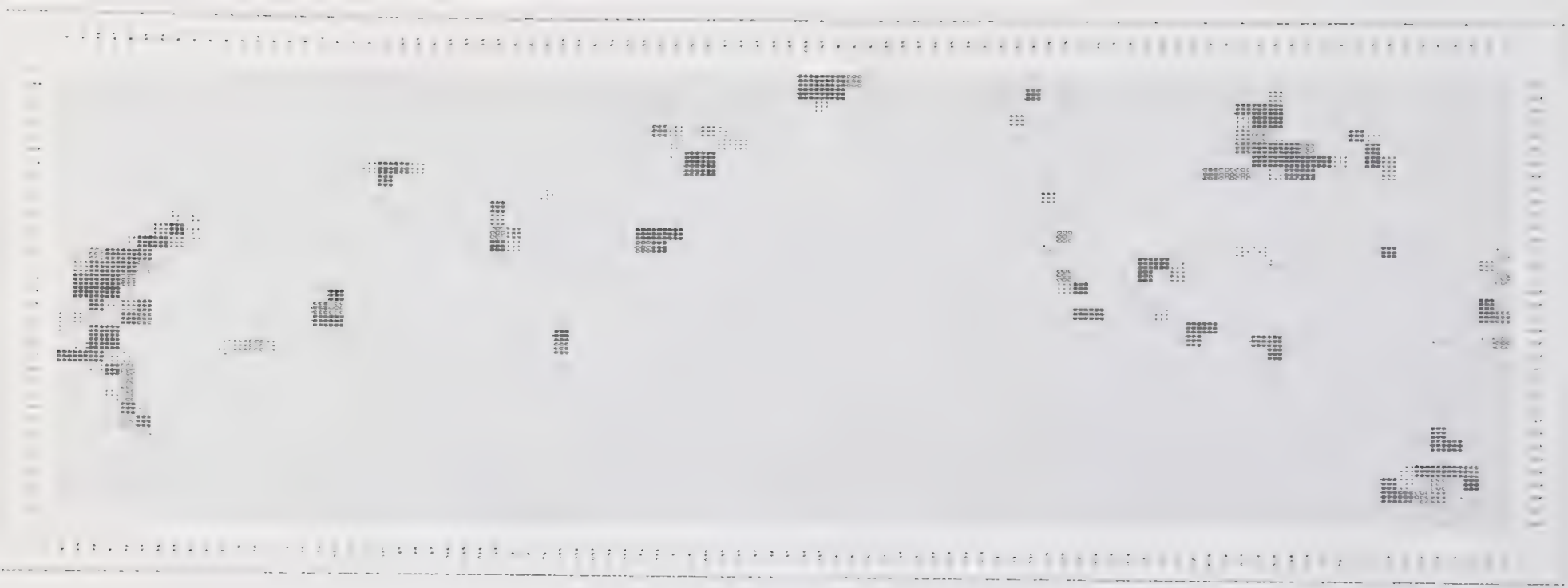

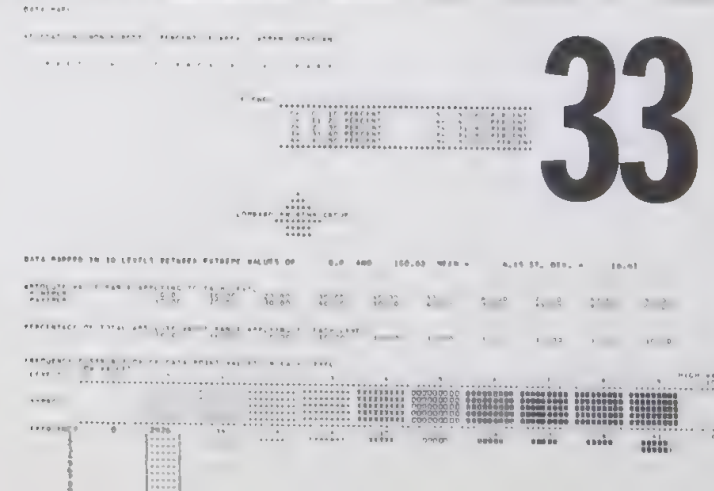

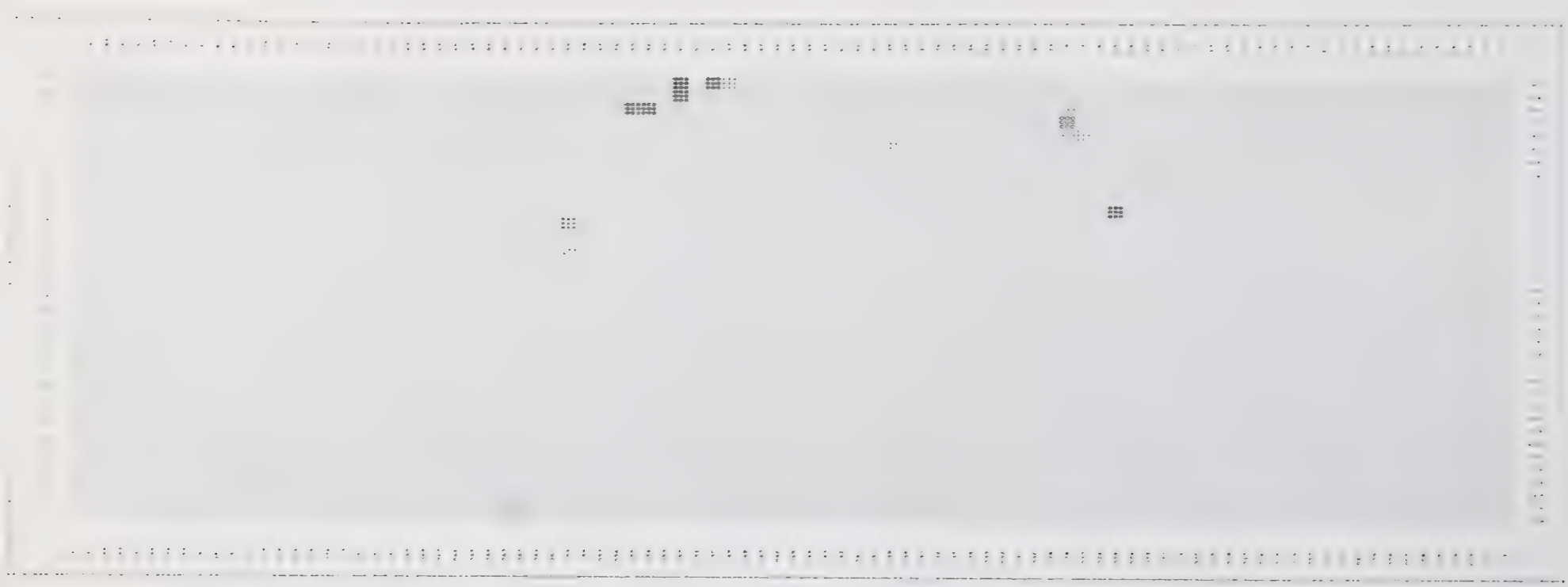

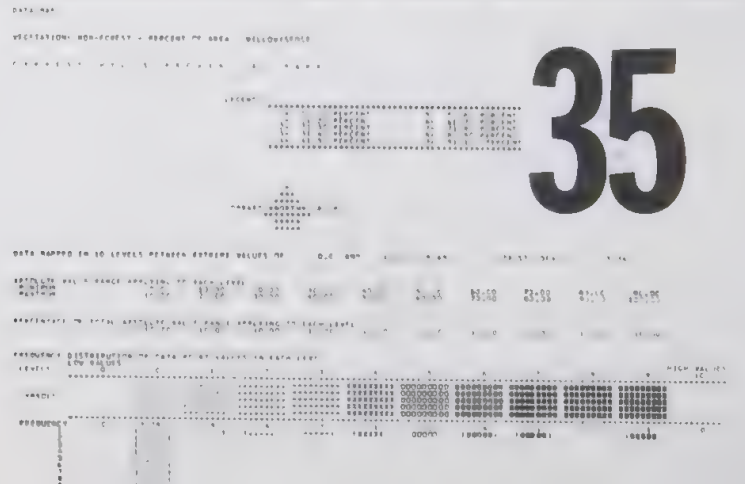
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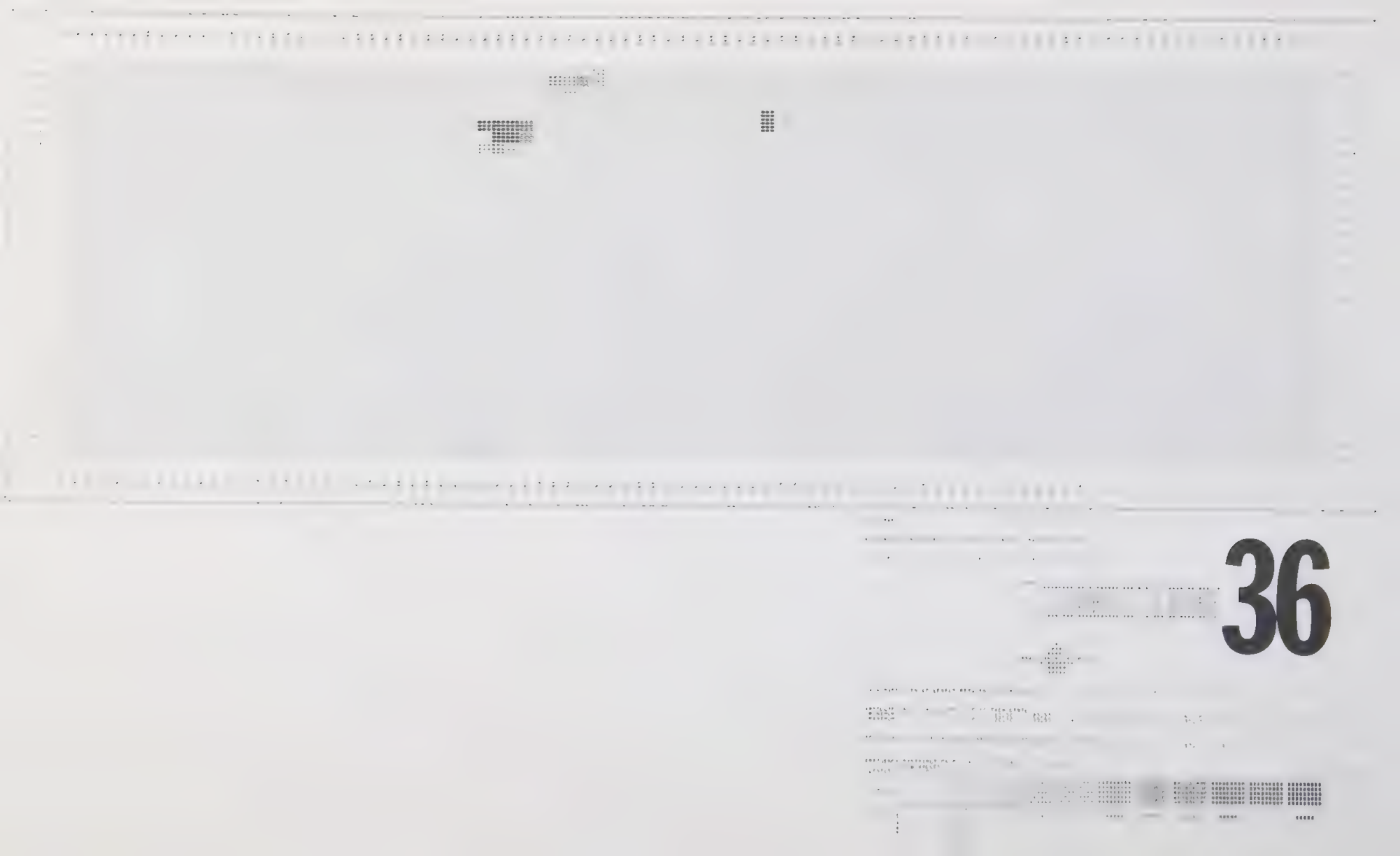

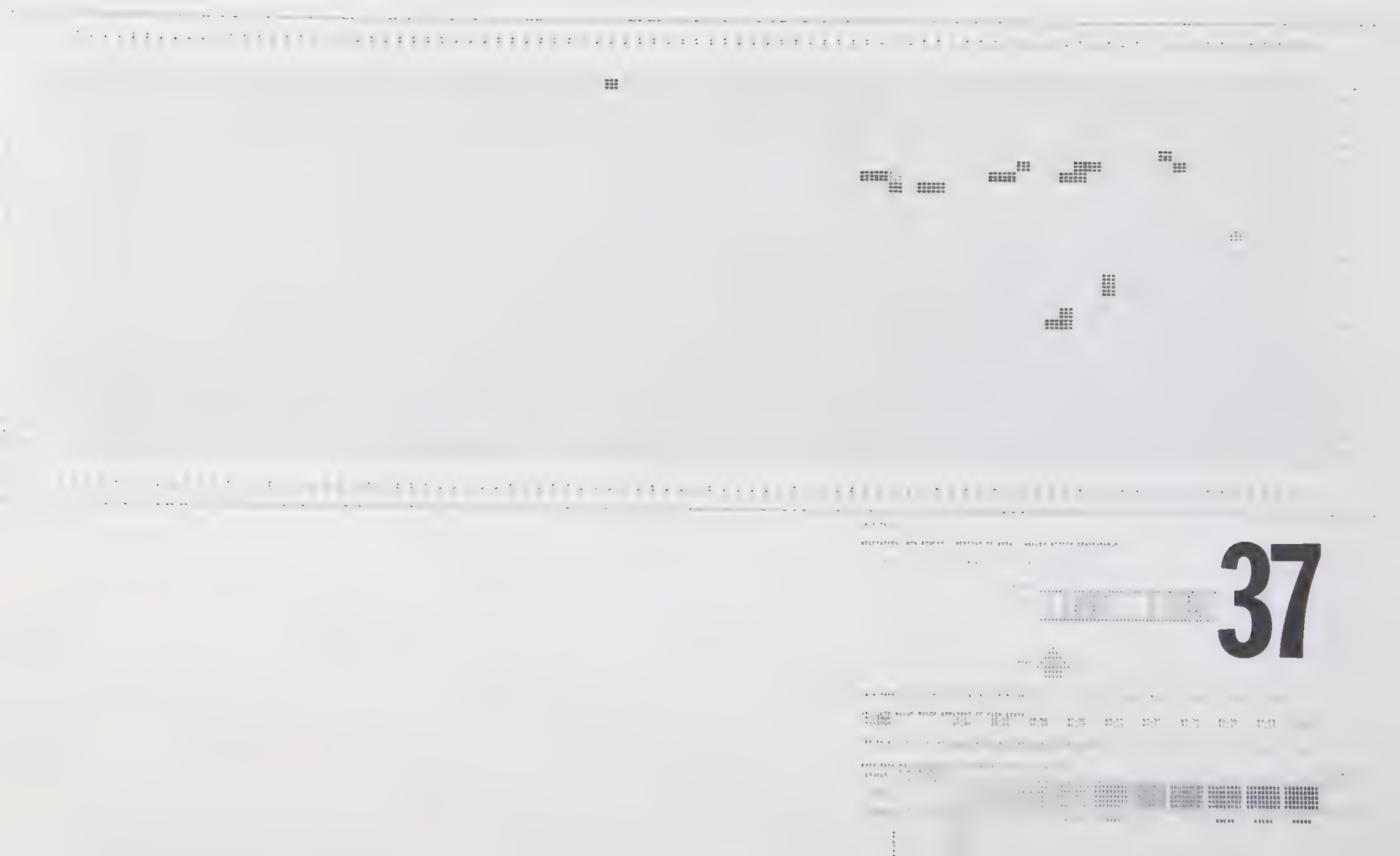

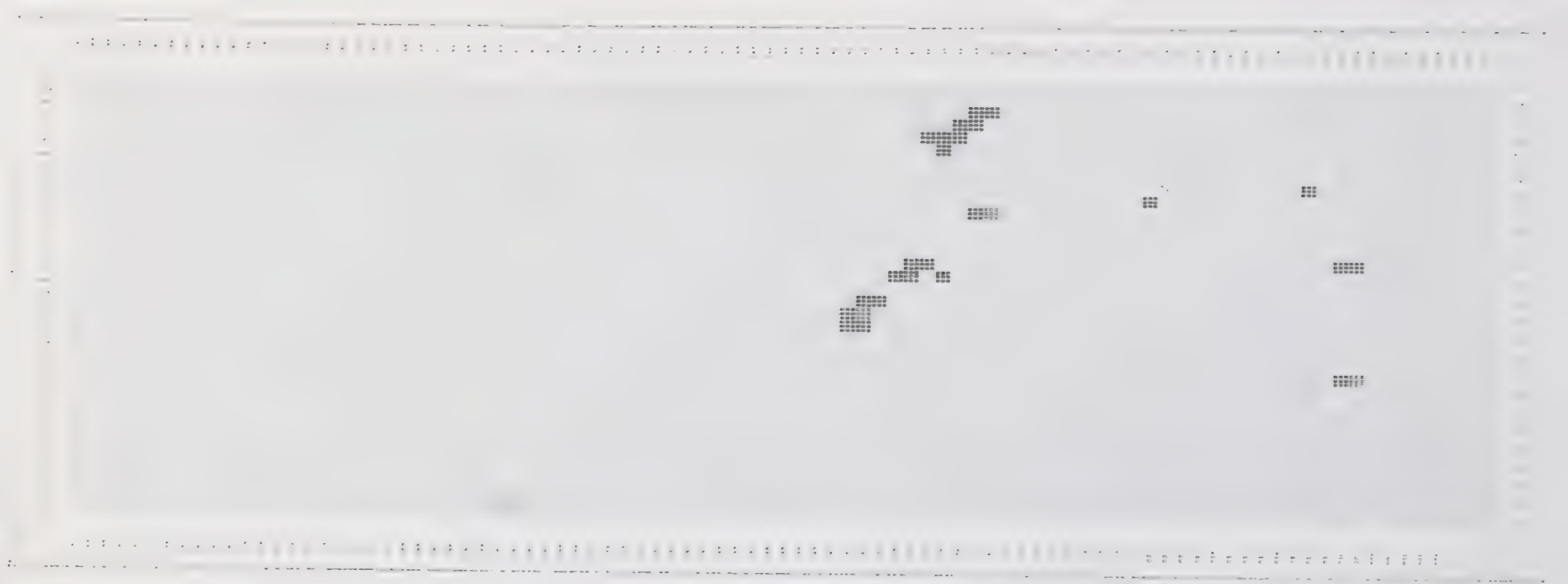

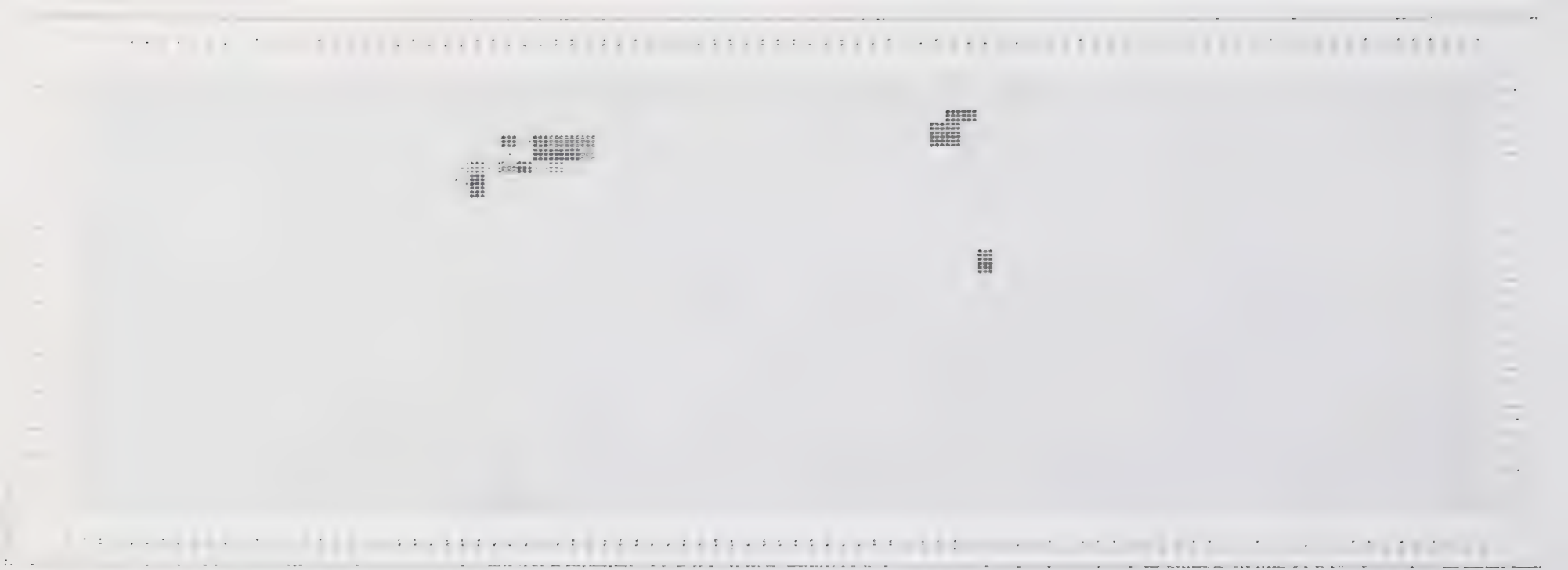

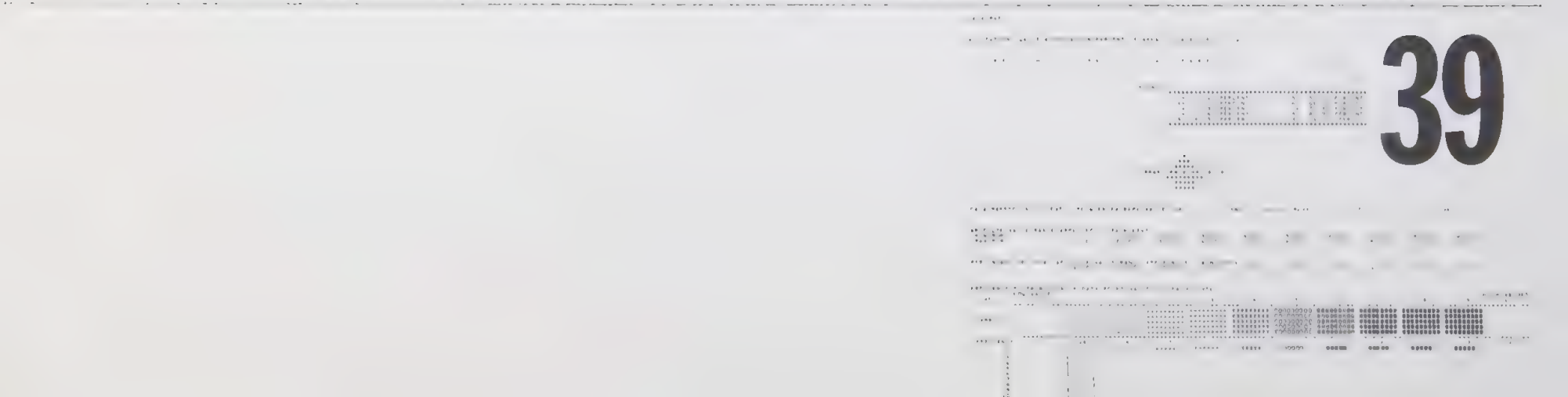

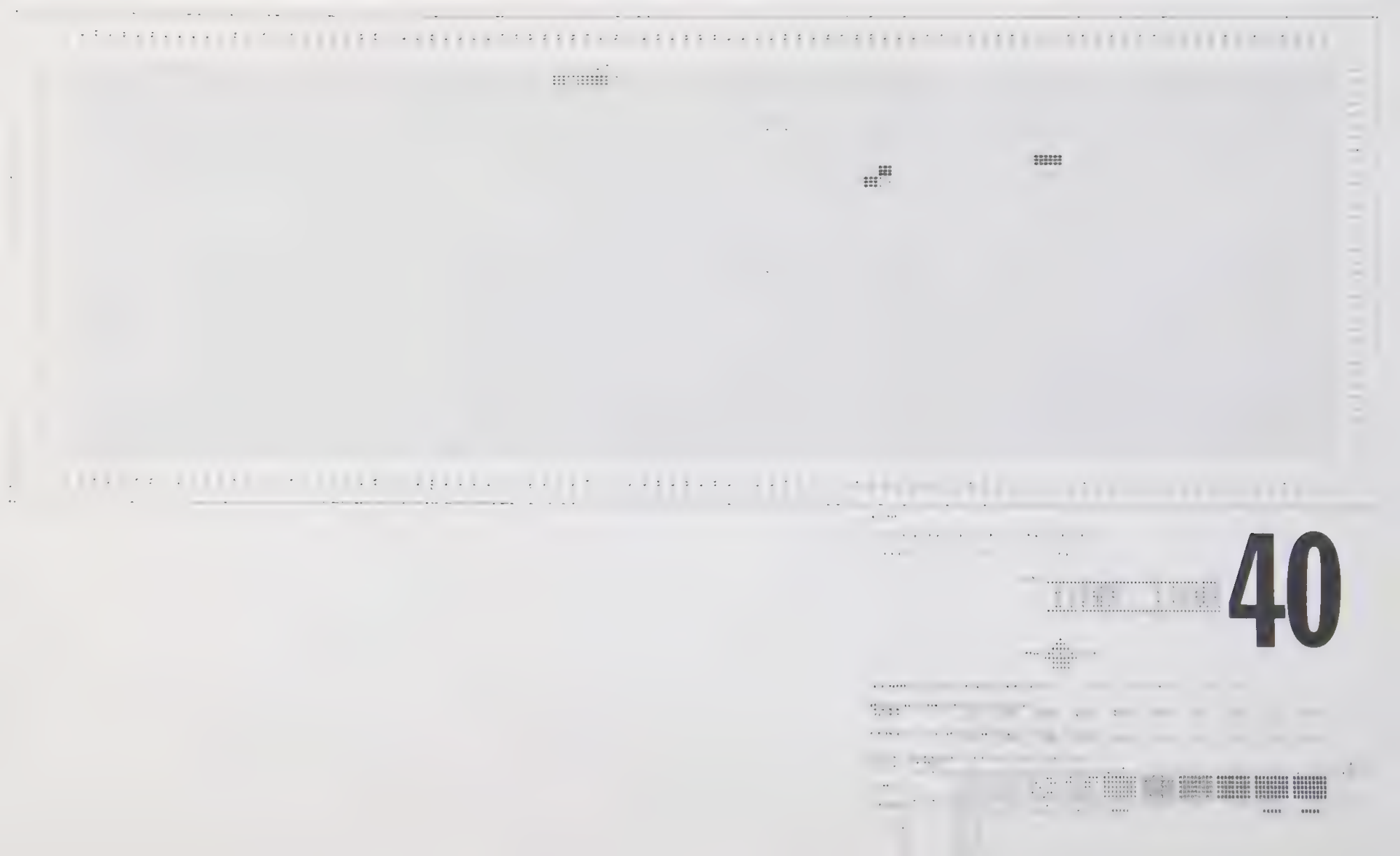

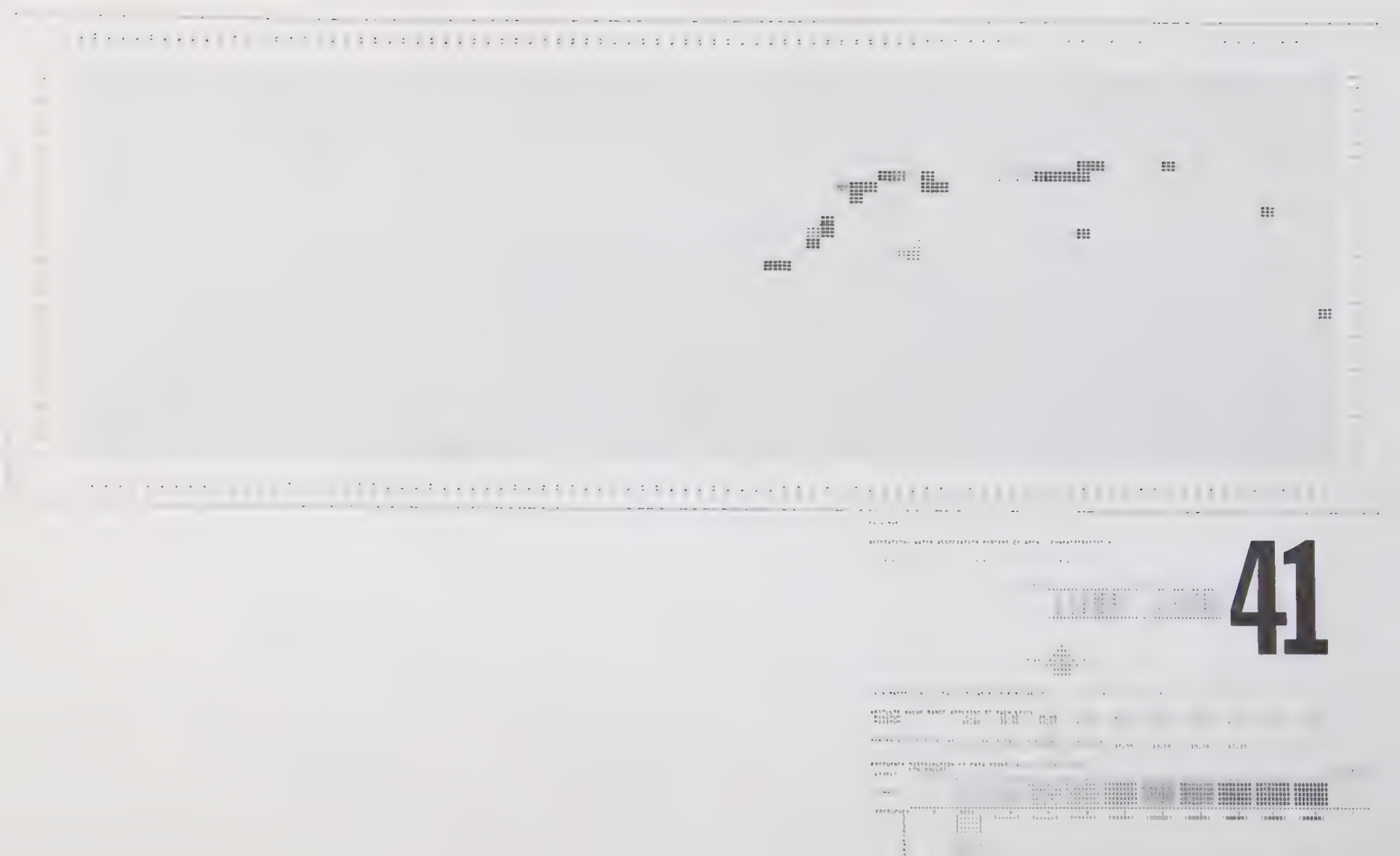
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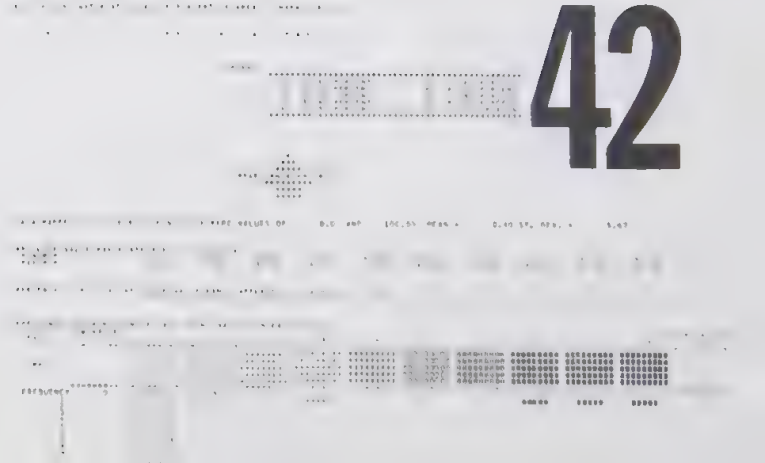
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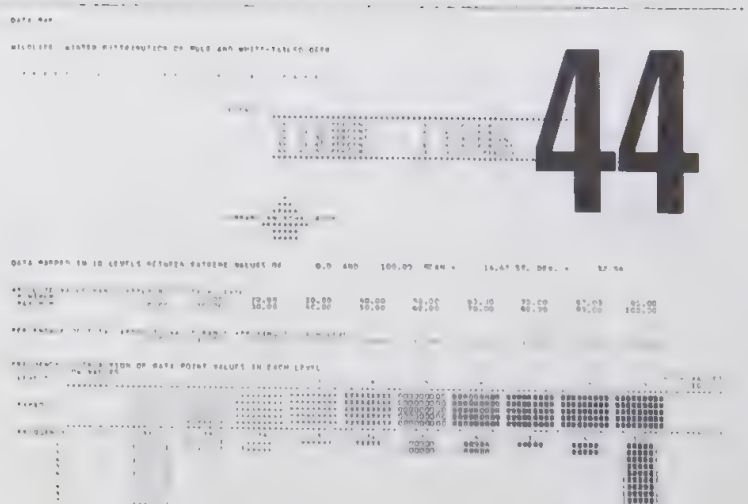
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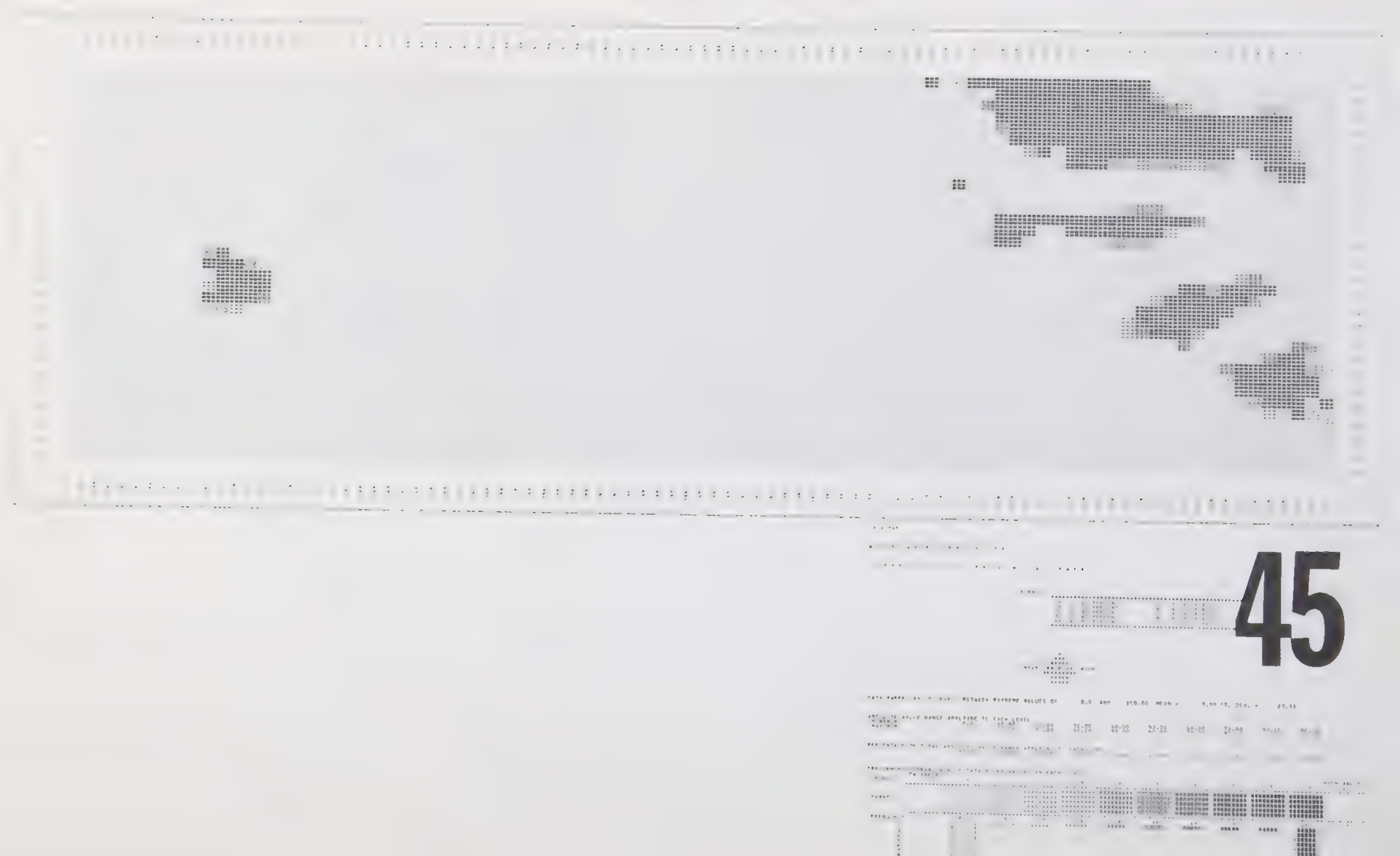

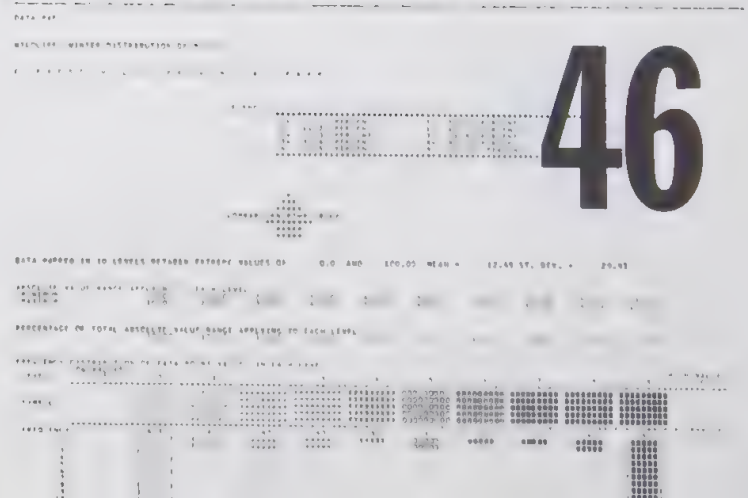

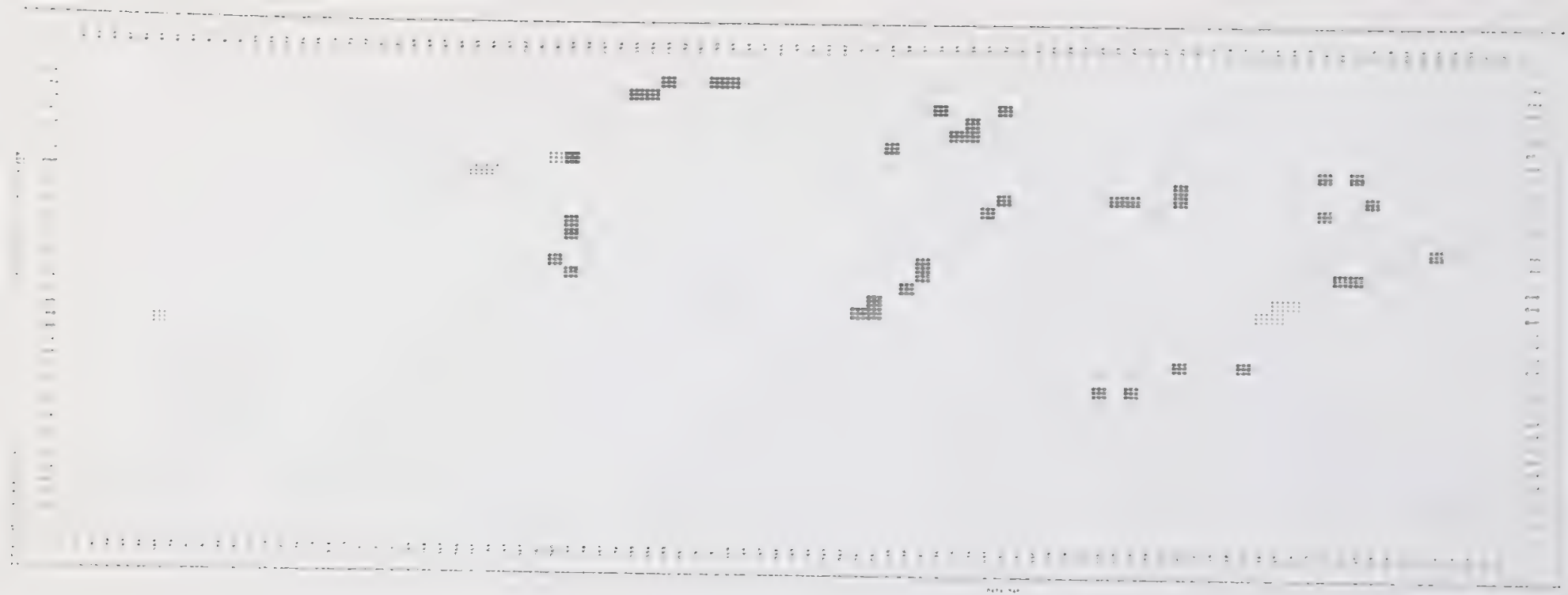

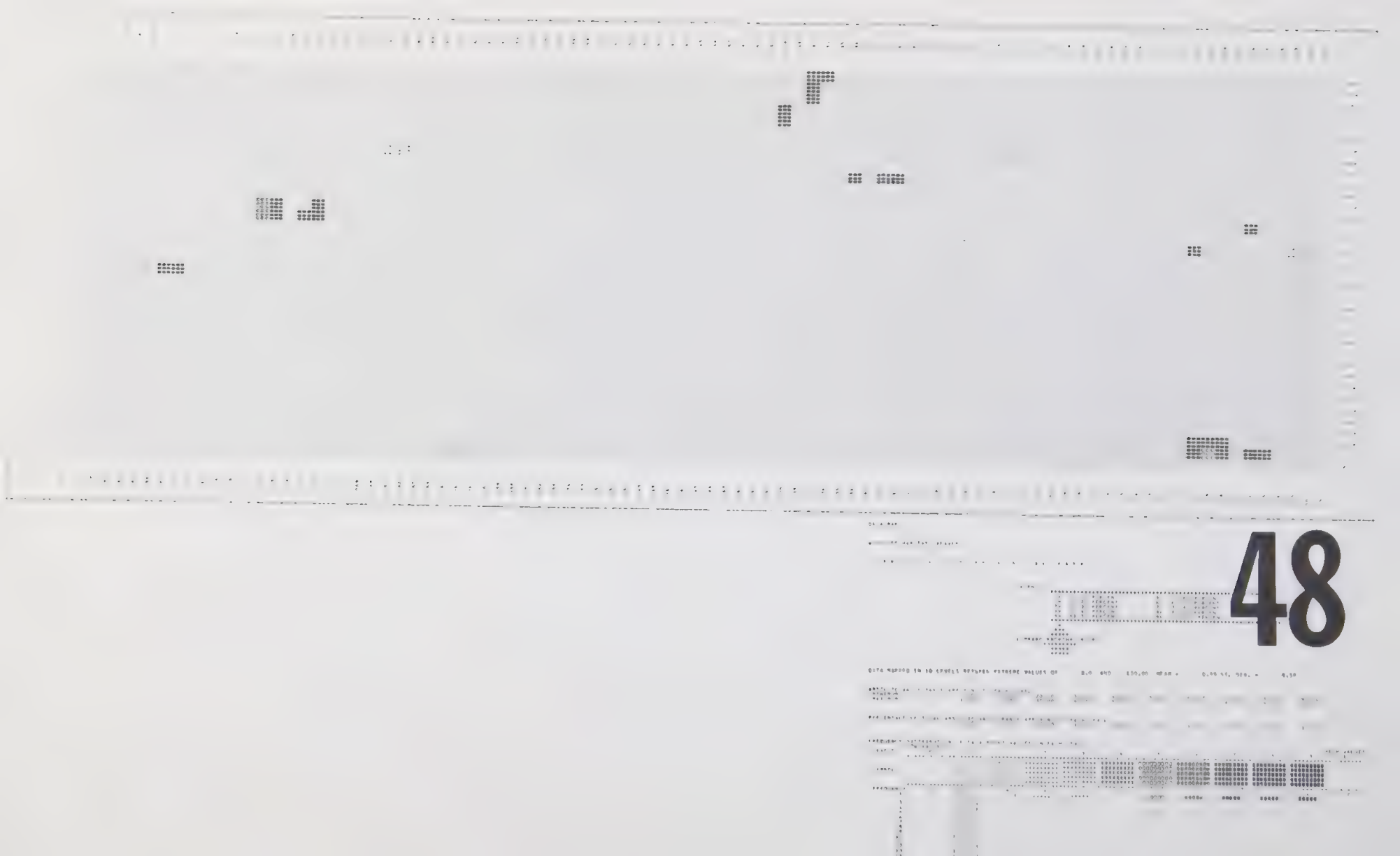
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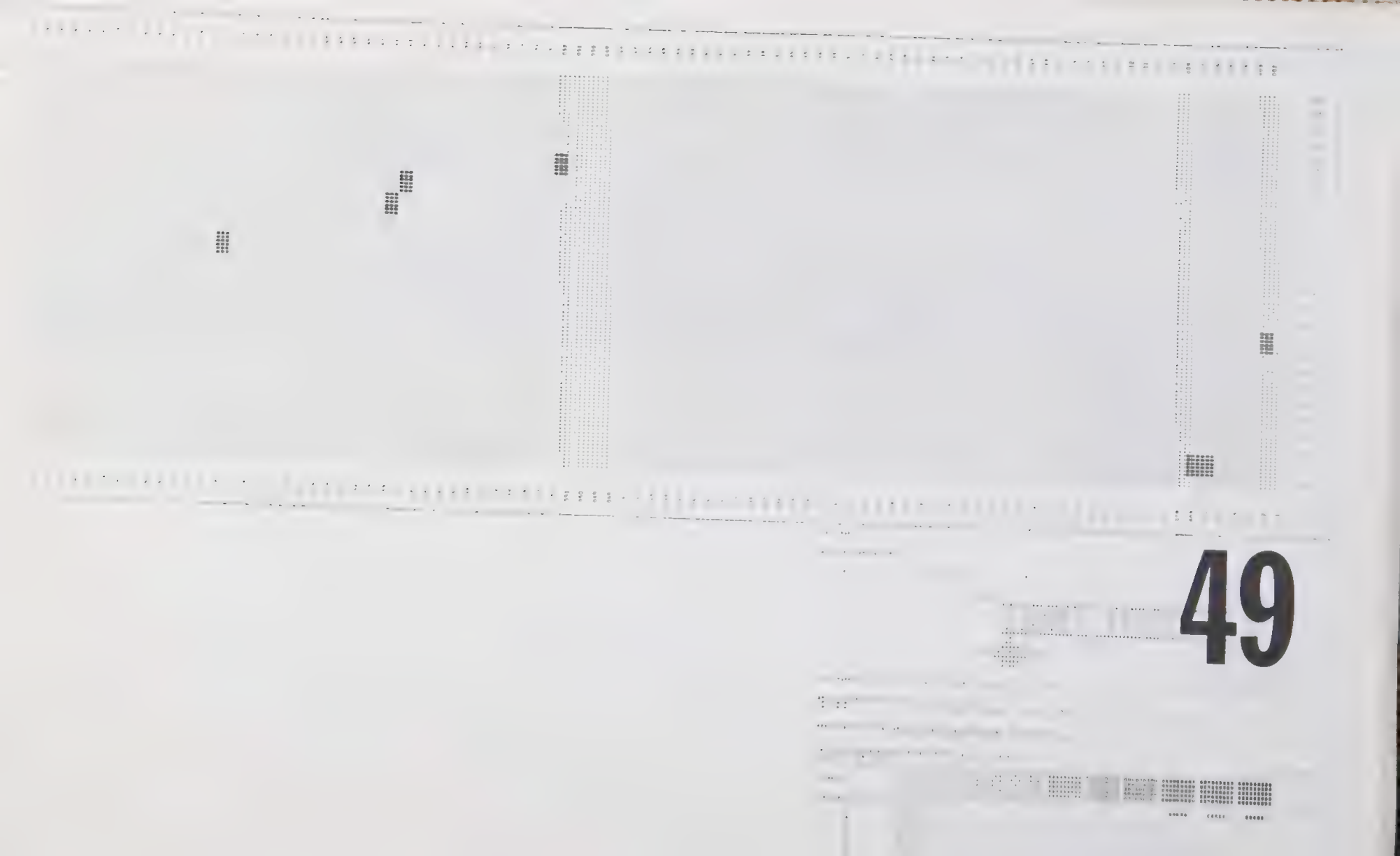
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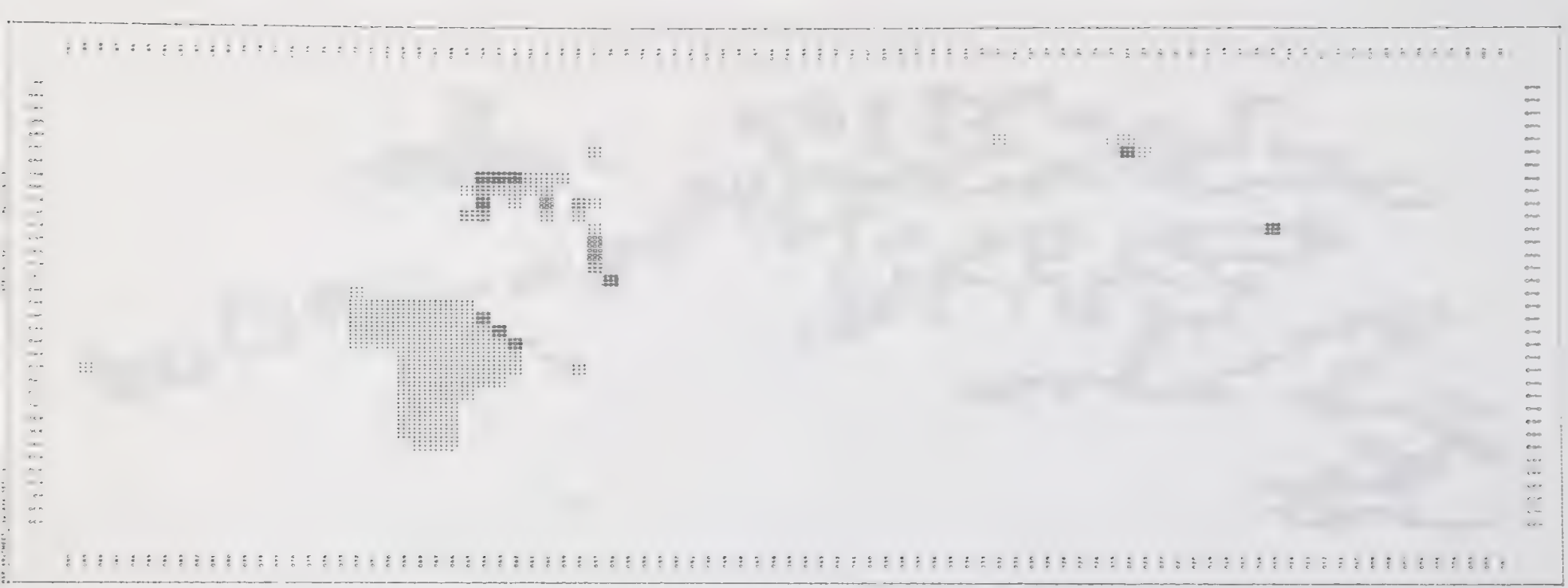

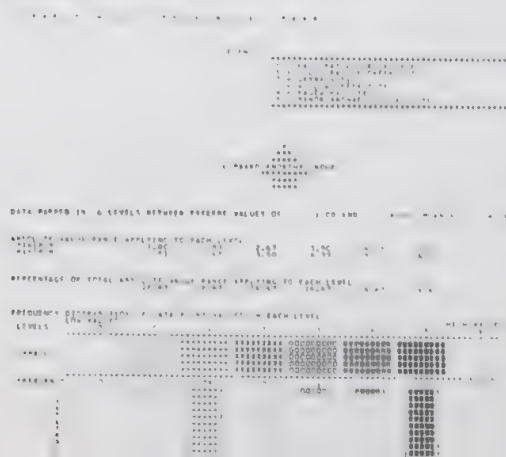

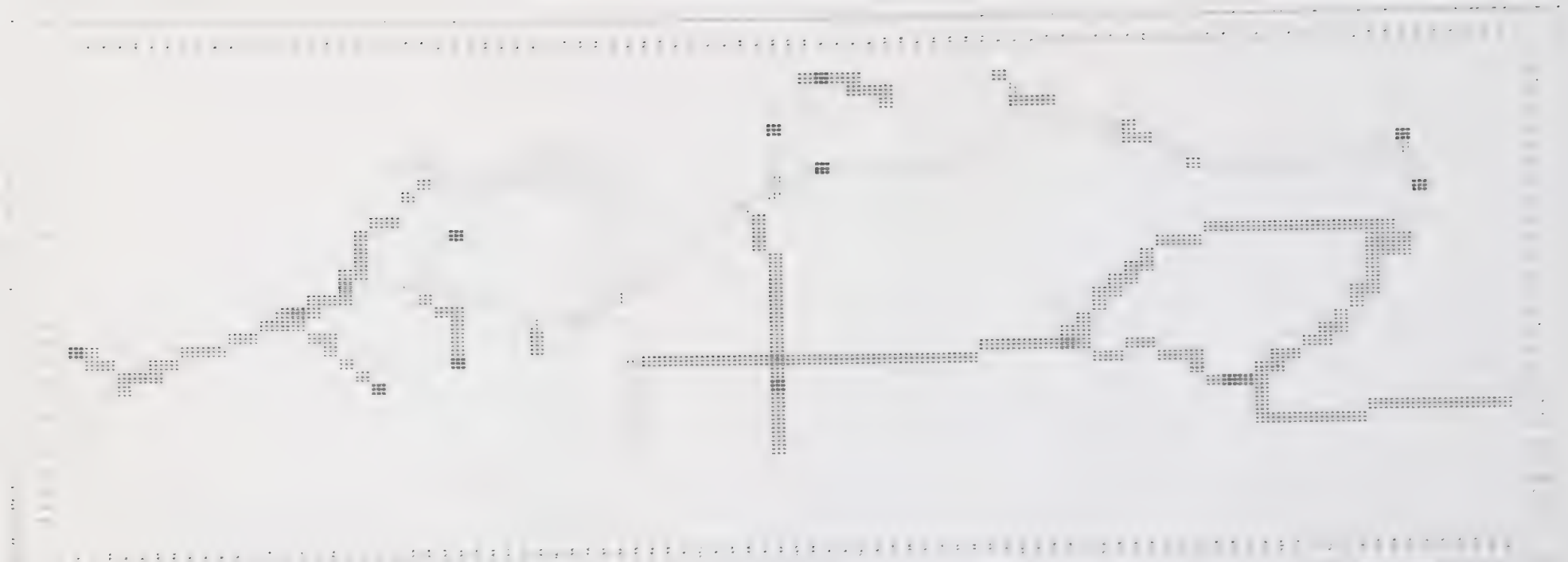

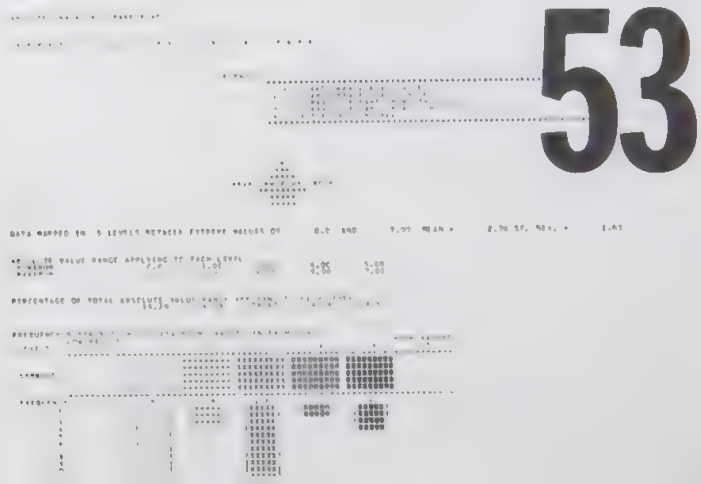

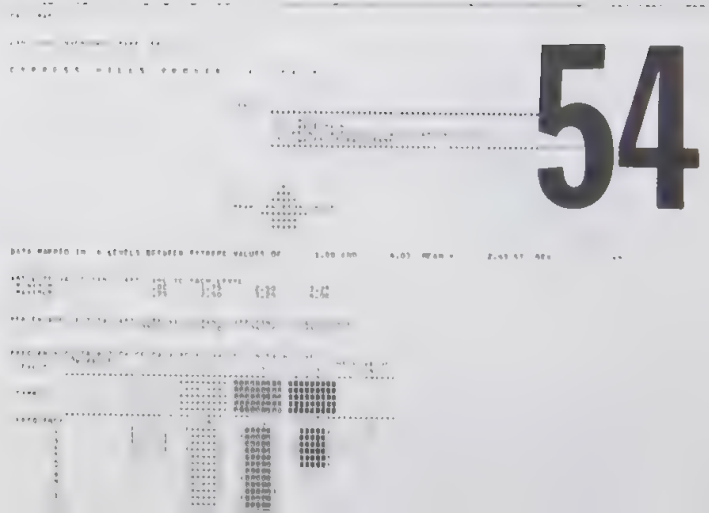
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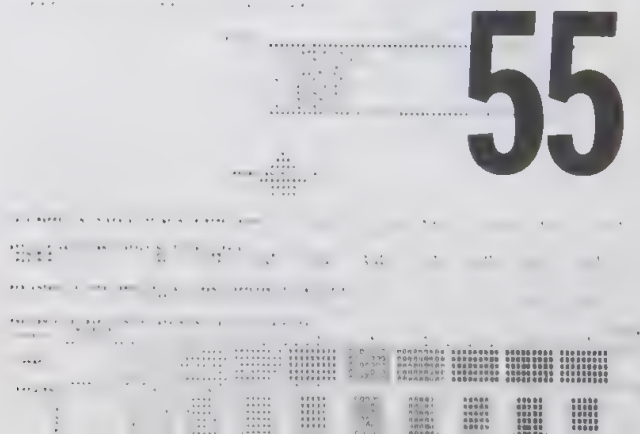
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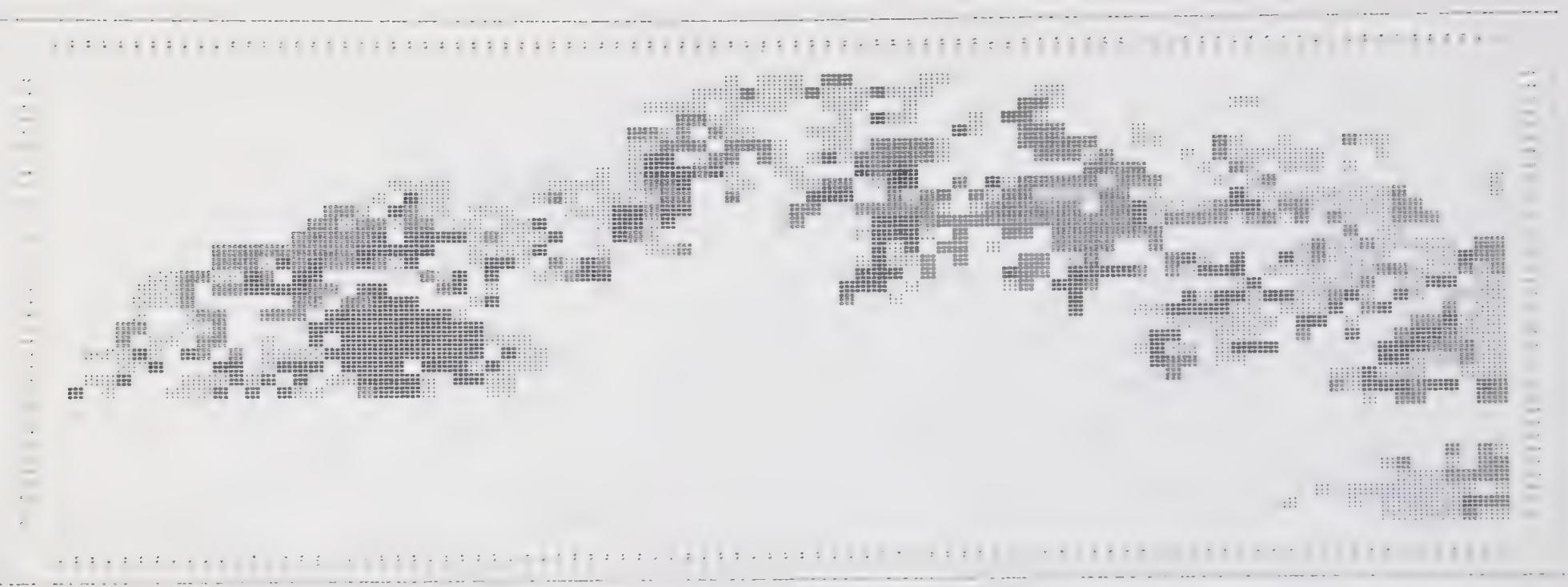

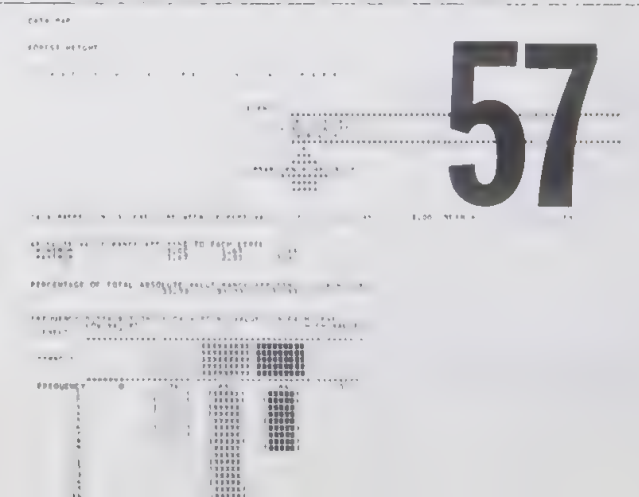
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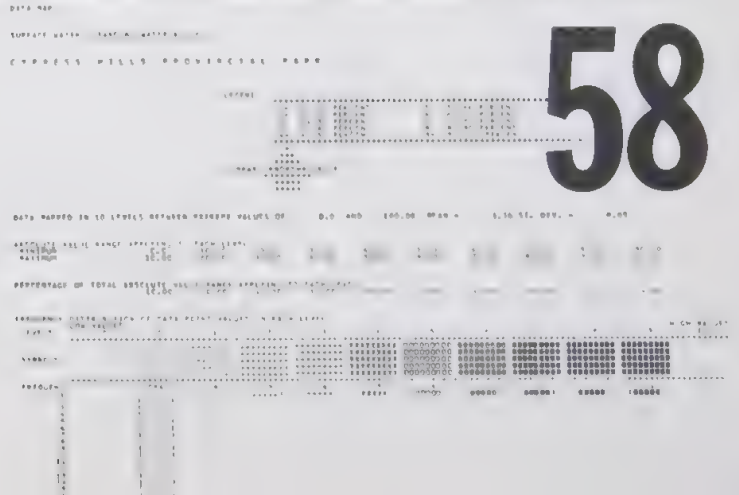
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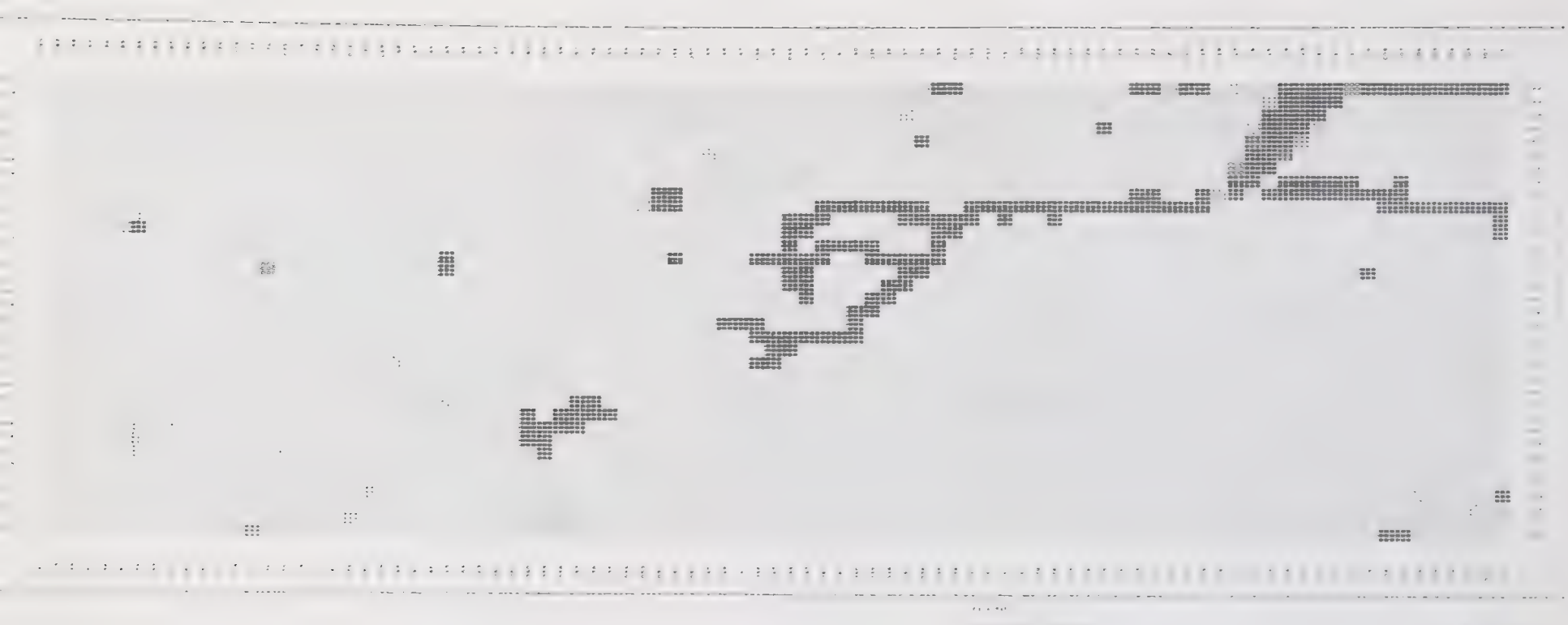


List of Soils Maps

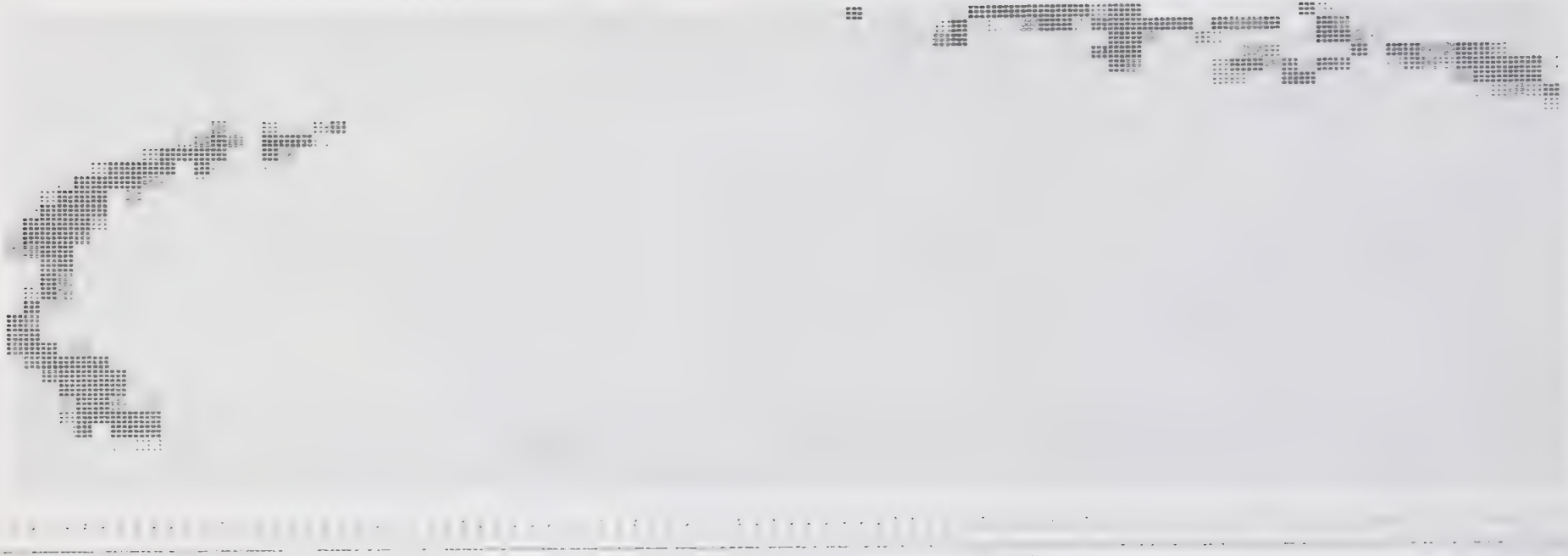
60. Soil Texture: Coarse (Per cent of Area)

61. Soil Texture: Medium (Per cent of Area)

62. Soil Texture: Fine (Per cent of Area)

63. Soil Texture: Fine/Organic (Per cent of Area)

64. Soil Texture: Loess (Per cent of Area)



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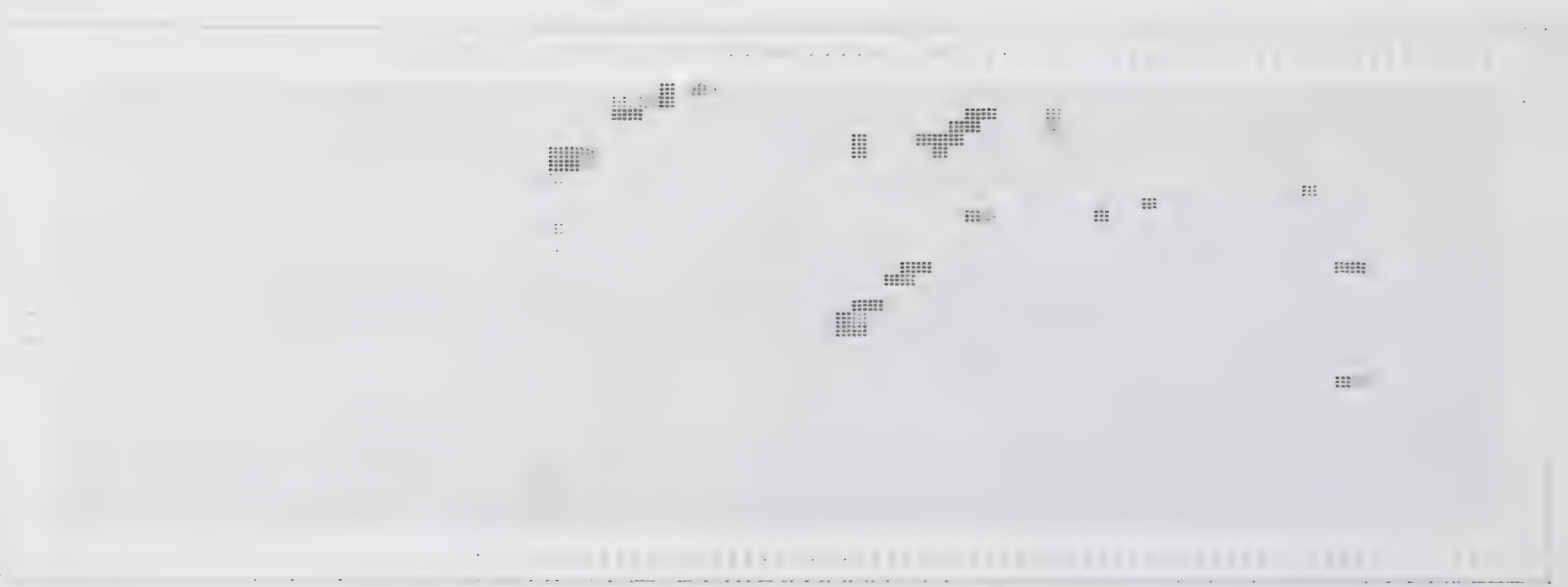

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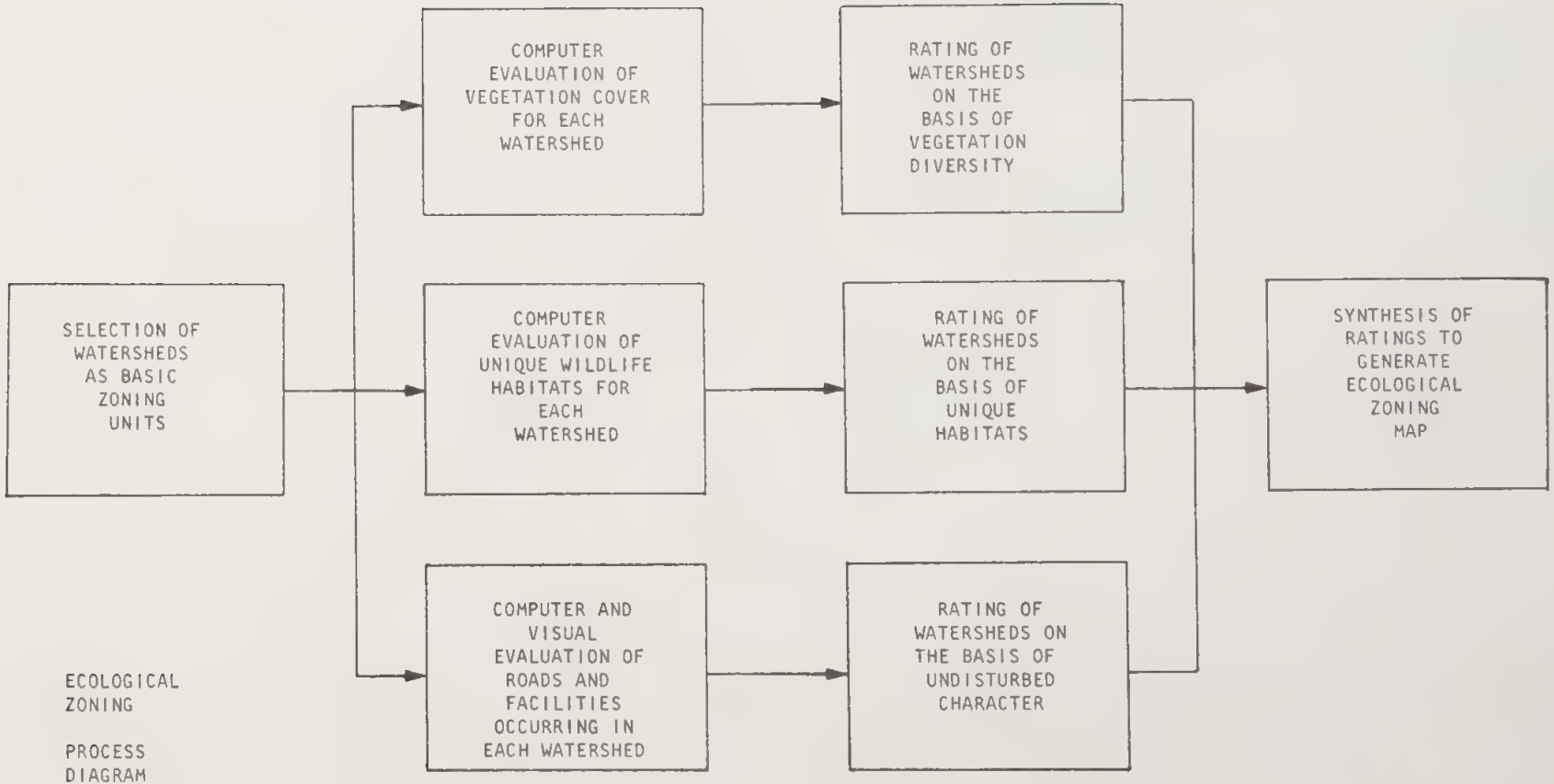
ECOLOGICAL ZONING


SELECTION OF WATERSHEDS AS BASIC ZONING UNITS
COMPUTER EVALUATION OF VEGETATION COVER FOR EACH WATERSHED
COMPUTER EVALUATION OF UNIQUE WILDLIFE HABITATS FOR EACH WATERSHED
COMPUTER AND VISUAL EVALUATION OF ROADS AND FACILITIES OCCURRING IN EACH WATERSHED
RATING OF WATERSHEDS ON THE BASIS OF VEGETATION DIVERSITY
RATING OF WATERSHEDS ON THE BASIS OF UNIQUE HABITATS
RATING OF WATERSHEDS ON THE BASIS OF UNDISTURBED CHARACTER
SYNTHESIS OF RATINGS TO GENERATE ECOLOGICAL ZONING MAP

ECOLOGICAL ZONING

PROCESS DIAGRAM

ECOLOGICAL ZONING

Zoning Unit Selection

The principle behind the use of ecological zones is that environmental qualities and natural carrying capacities should indicate generally the most appropriate uses for various areas of the Park. A zone therefore, should be a functional unit. Activities which cut across natural units could adversely affect the integrity of that same unit. Of all the natural units which might be chosen to determine the pattern of boundary zones, the watershed unit was selected. (A watershed unit is defined as an area contained within a drainage divide of a first order stream.) The watershed unit has certain important qualities which other natural units do not possess (i.e. surficial geology, soils, vegetation, etc.).

Firstly, the Cypress Hills is a plateau therefore the Park has control over the watersheds at the point of origin. Secondly, watersheds have a more dynamic quality than other resource units. For example, if one was to establish two zones which bisected the watershed and then classed the zone in the upper reaches of the watershed as an intensive use zone and the zone in the lower reaches a wilderness zone, it is possible that facilities and activities in the extensive use zone could adversely affect the wilderness zone (i.e. reduction or diversion of stream flow, alteration of water quality, etc.). Finally the watershed units are of a manageable size. That is they are neither too small nor too large to be functional.

The selection of the watershed unit is not intended to imply that other resource features were not respected. At this stage it was merely a division of the Park area and its immediate surroundings into areas of a functional and manageable size. Following determination of boundary lines the units themselves can be evaluated.

Zoning Evaluation Criteria

The following three criteria were determined to be the most important variables in evaluating the ecological significance of a watershed unit.

Diversity

By this it is meant the diversity of cover vegetation types. The greater the diversity of cover types, the greater the diversity of wildlife. Also the diversity implies greater area of "edge".

Ecological Uniqueness

The more rare natural features which might occur in a watershed the greater its value in serving the functions of science, conservation and education or interpretation. (See Inventory for identification of unique features.)

Undisturbed Character

The fewer roads, campgrounds, etc., the less disturbed an area can be assumed to be. The less disturbed an area the more representative it is of the "natural" landscape of the Cypress Hills.

By evaluating each of the 14 watersheds on the basis of their diversity, undisturbed character and uniqueness, it is possible to generate a relative weighting of the watersheds which in turn will suggest the zoning classification which is most appropriate. The area which is most diverse, least disturbed and has the greatest number of unique features should be zoned in the most restrictive fashion.

An important question which arose at this point in the study was that of unequal weighting of the three criteria. For example, ecological uniqueness could have been weighted three times as heavily as the other two criteria. It was felt that unequal weights should only be applied after a full series of unweighted maps were produced and examined. However, upon examination of the unweighted series of analysis maps, they were found to be acceptable, and therefore weighted versions of these particular maps were not produced.

Computer-Assisted Evaluation

As described above, there were three major criteria forming the ecological zoning procedure; diversity, ecological uniqueness, and undisturbed character. The computer was used to assist in ranking each of the fourteen watershed units based on the three selected criteria.

Weighting the Variables

In order to rank the watershed units as to their relative quality, the following weighting scheme was developed and applied. (see Appendix document for listings of the Fortran programs employed).

Weighting the factors for Watershed Ranking:

Diversity -

Total the number of different vegetation characteristics within each cell and assign the cell a value representing that number of characteristics.

Uniqueness -

Characteristic in Cell:	Score
Deer Habitat (Mule & White-tailed)	6
Elk Habitat	8
Moose Habitat	7
Unique Bird Habitat -	
Broad-winged Hawk	12
Pied-Billed Grebe	10
MacGillivray's Warbler	10
Rare Nesting Species	13
Unique Small Mammal Habitat -	
Beaver	7
Mink	9

Undisturbed Character -

Characterisitc in Cell	Score
Park Roads -	
1 Hardsurface	-3
2 Hardsurface	-5
1 Gravel or Earth	-2
2 Gravel or Earth	-4
Cattle Gate	-4
Park Services -	
Well	-1
Watermain	-2
Spring (Camping Use)	0
Water Storage Tank	-5
Park Facilities -	
Campgrounds	-5
Scenic Lookout	-3
Fire Tower	-6
Saw Mill	-10
Golf Course	-8
Airstrip	-10
Picnic Area	-4
Monument	-2
Fishing Wharf	-9

Computer Evaluation Mapping

Each of the ecological zones was analyzed for diversity, uniqueness and undisturbed character. This was accomplished by examining the histogram bar charts which accompany the computer analysis maps. (See the pages 85-102). The shading level into which a particular cell falls indicates the number of resource features which occur within that area. For example, a single cell may have as many as seven vegetation cover types or as few as one. The histogram gives an indication of the percentage of cells which fall into a level. It was important to use this percentage when ranking the ecological zones because of their wide variation in size. It is obvious that if one went by the absolute number of top level cells, the largest area would come out with the highest rating.

Tables 1 and 2 indicate the relative ranking of all the ecological zones based on the interpretation of the histogram bar charts. Table 2 (page 105) is a sample of the evaluation procedure used.

● *DIVERSITY EVALUATION MAPPING*

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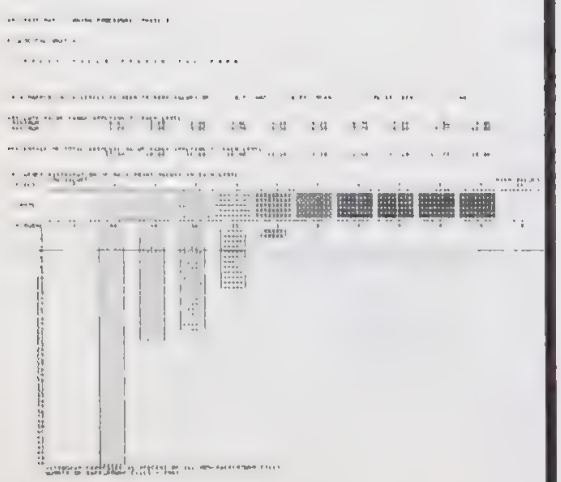

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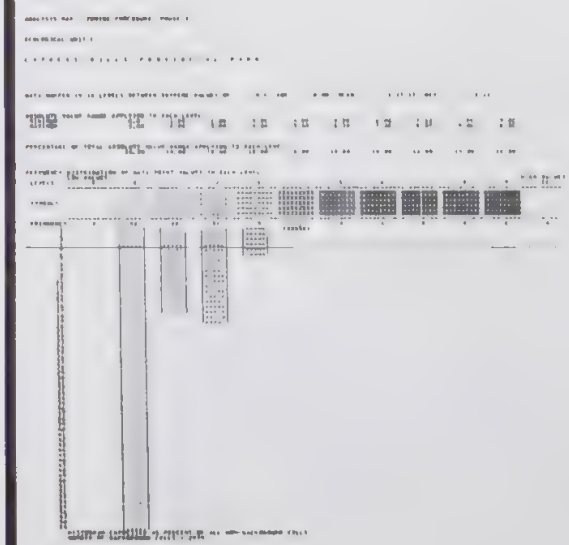

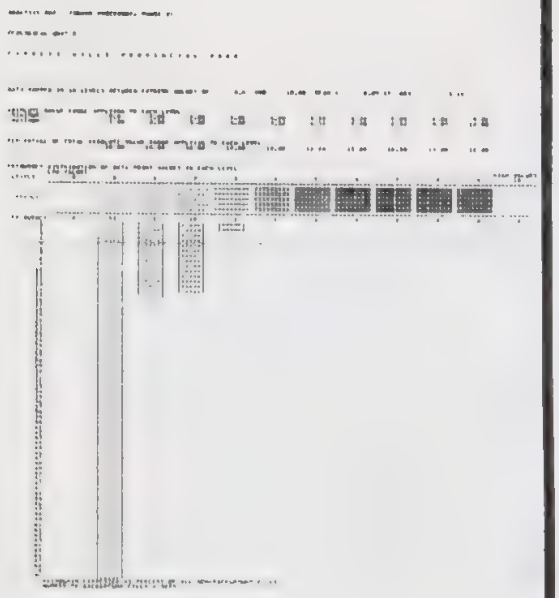

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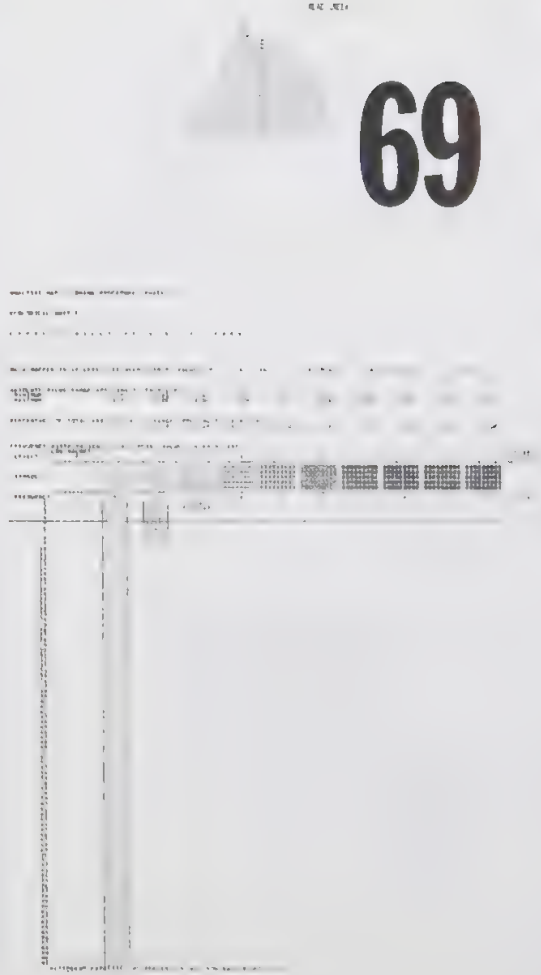

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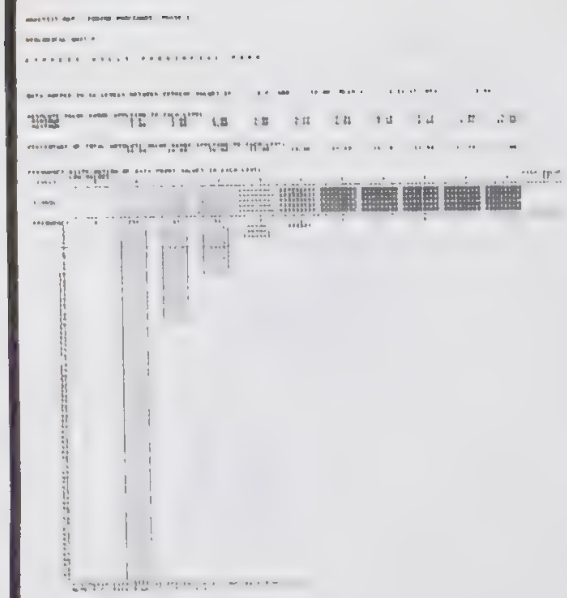

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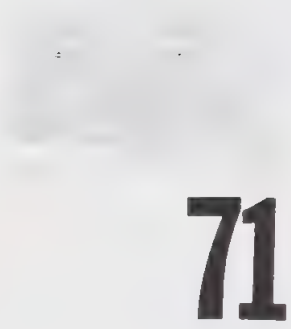

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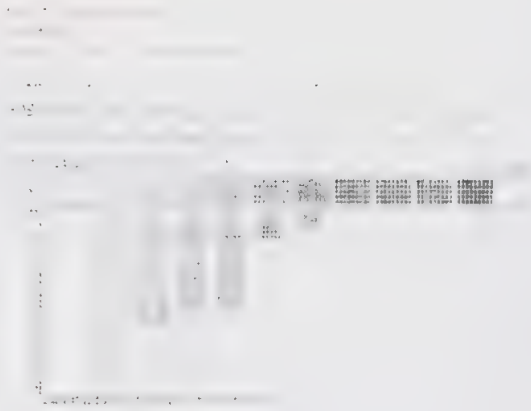

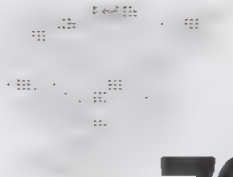

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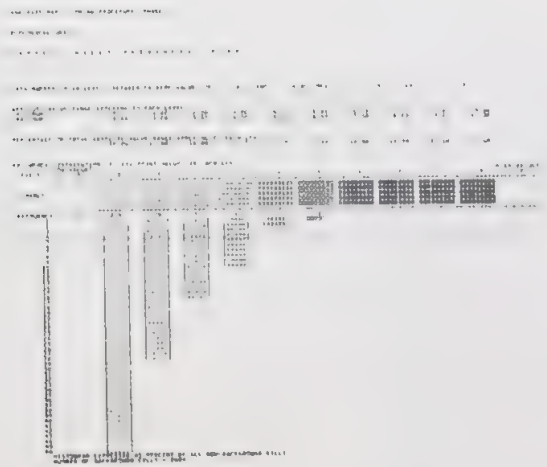

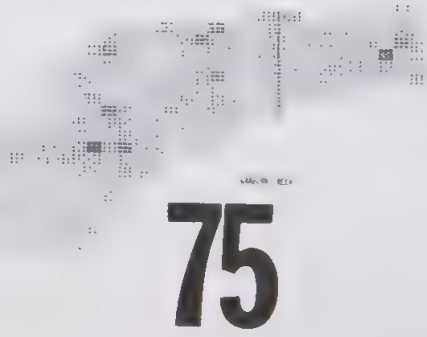

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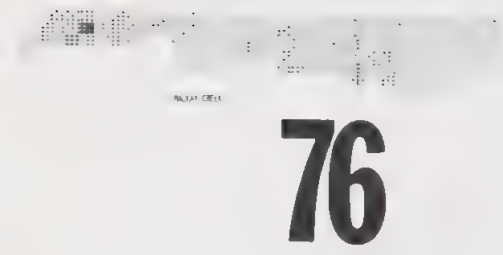

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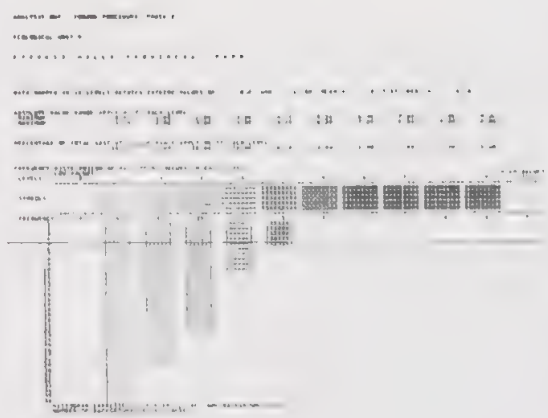

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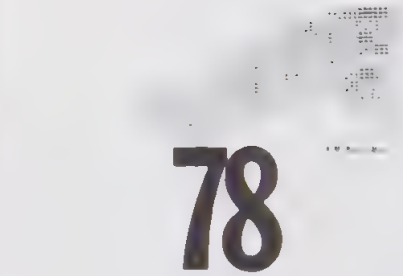

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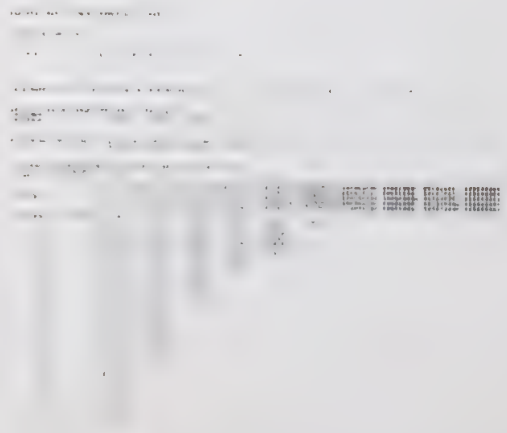

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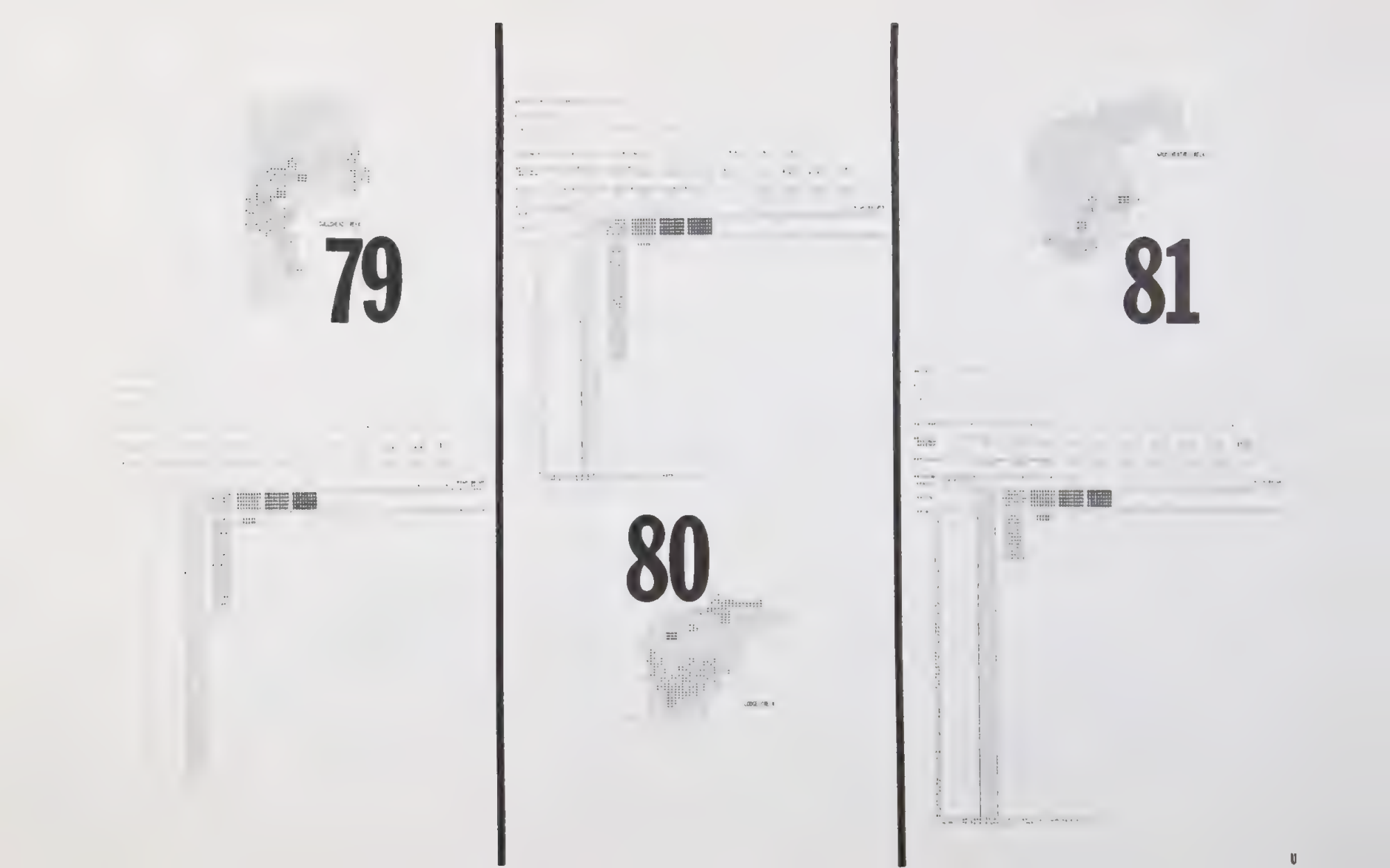
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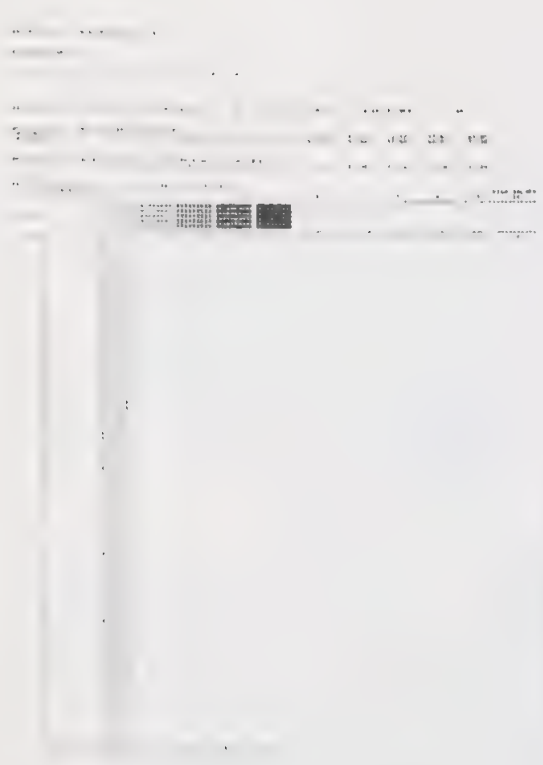

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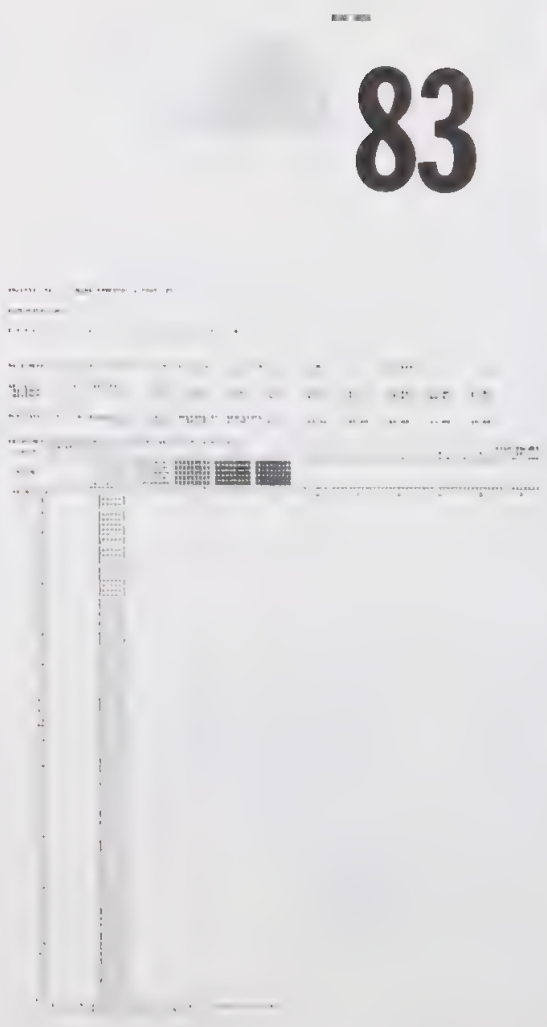

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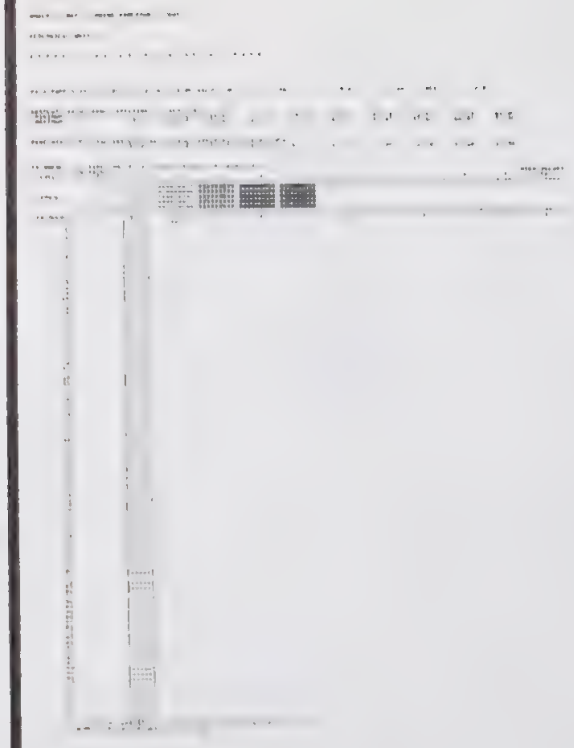

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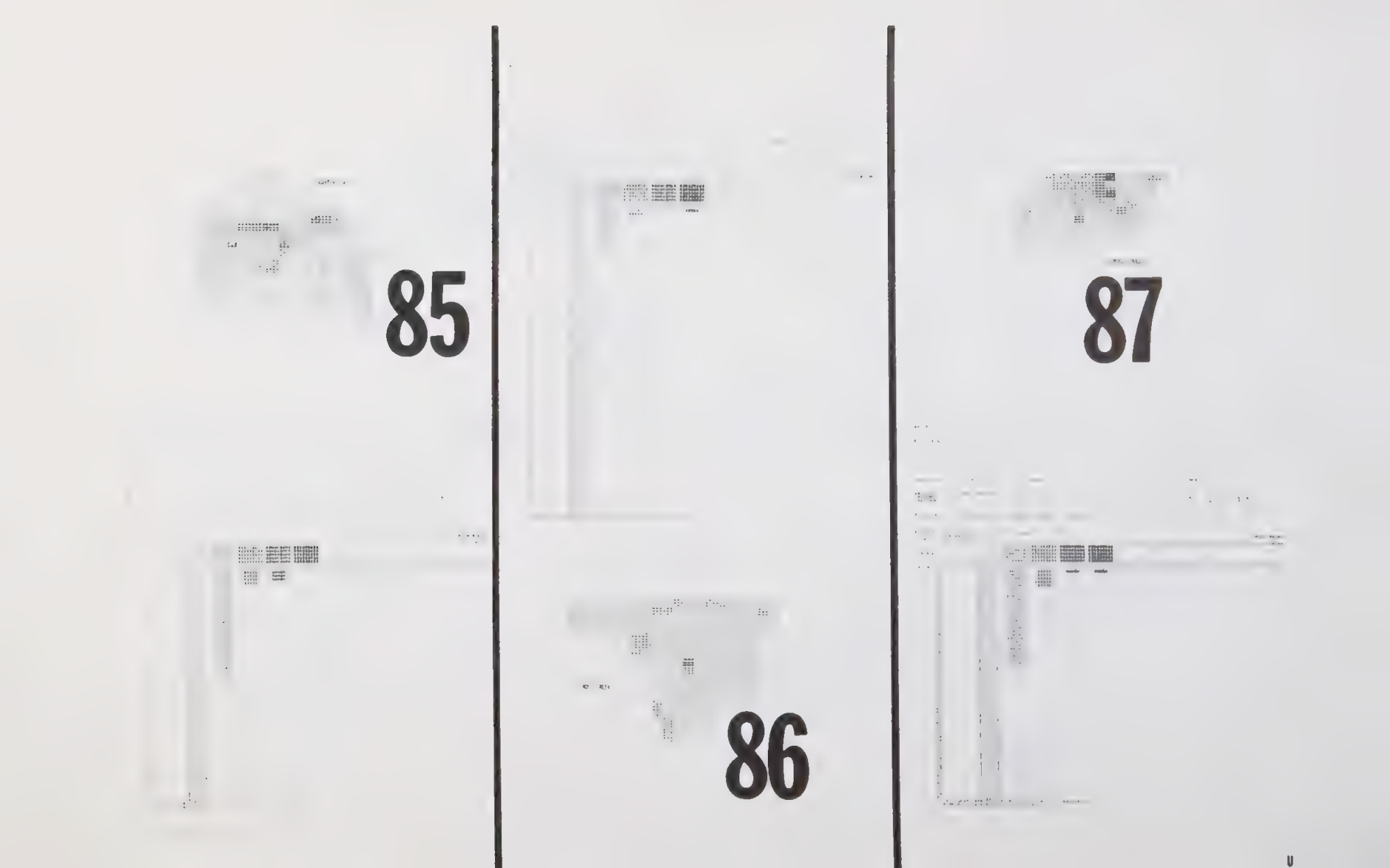
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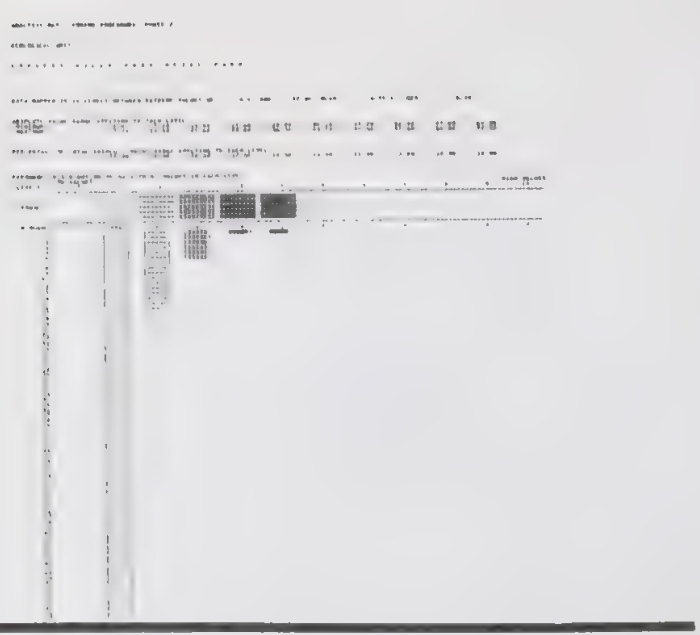

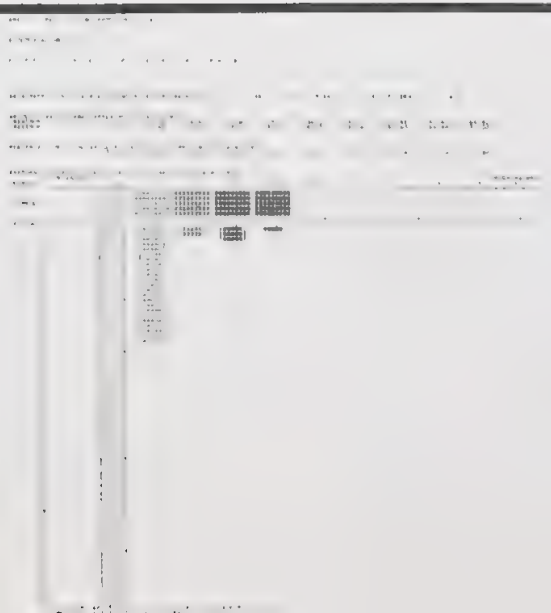

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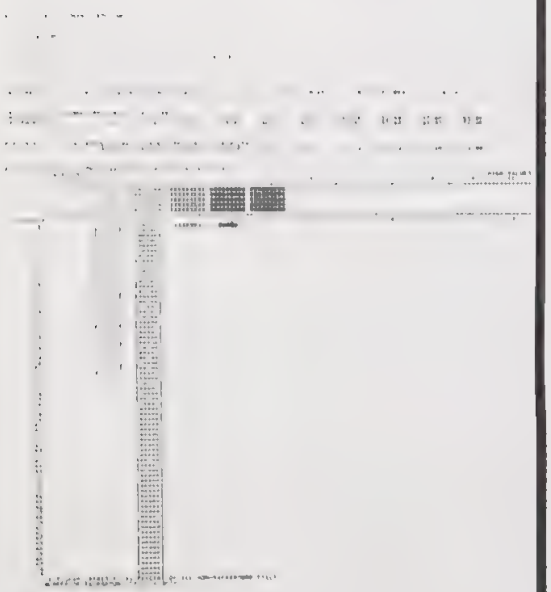

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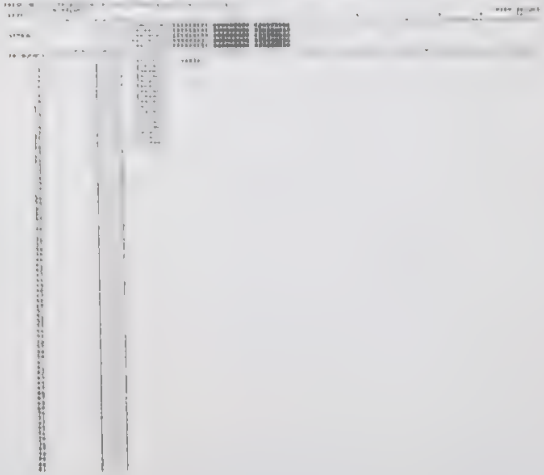

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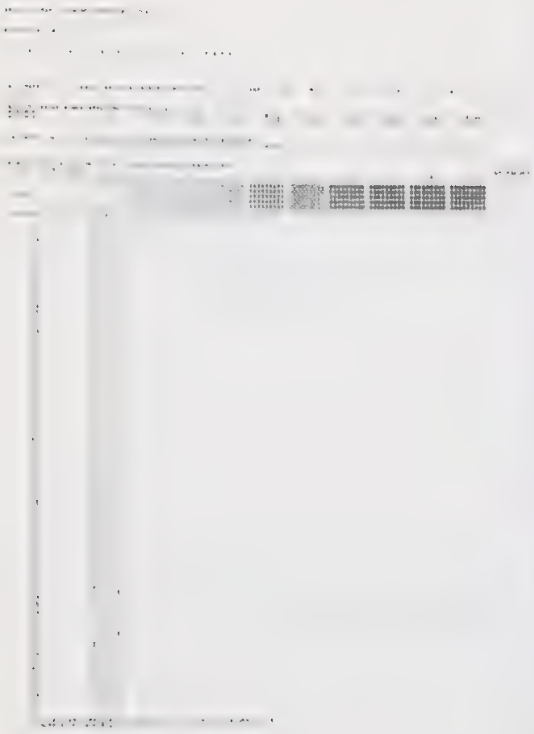

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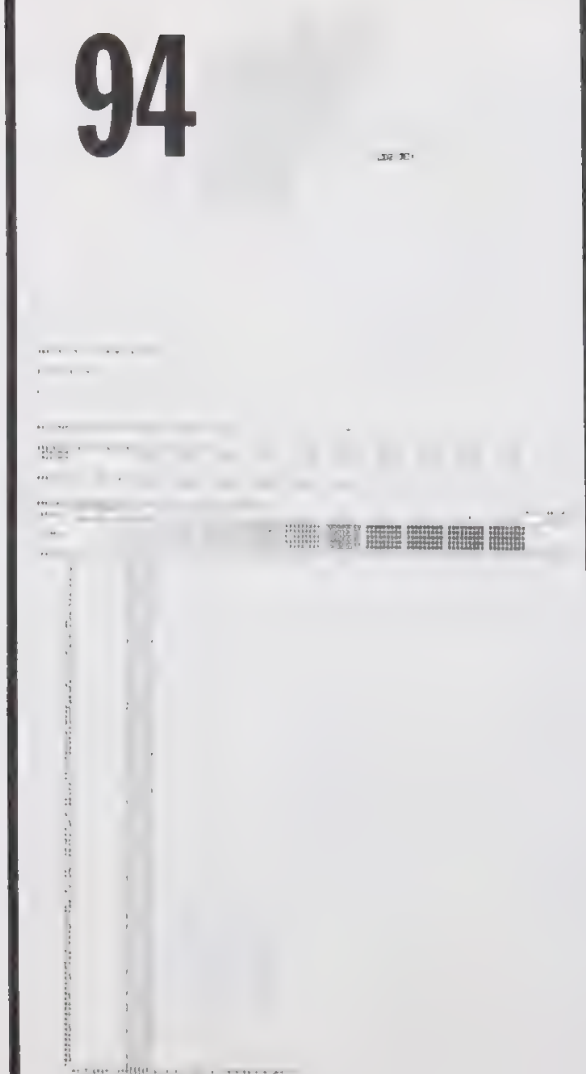

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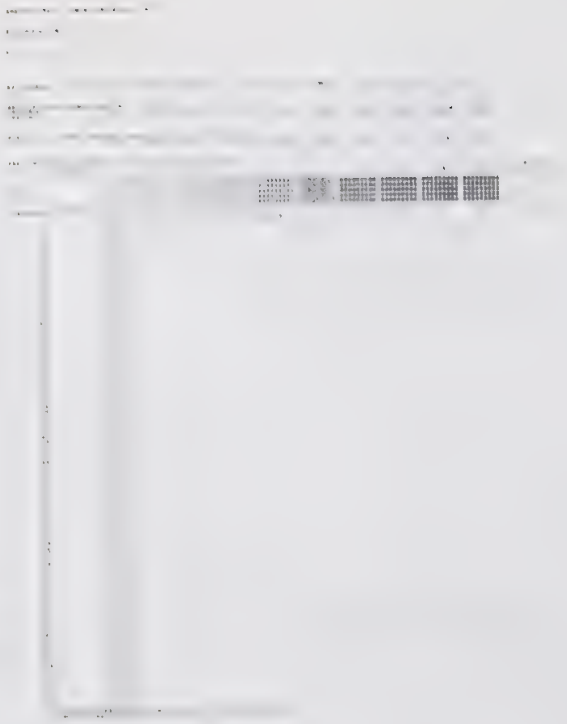

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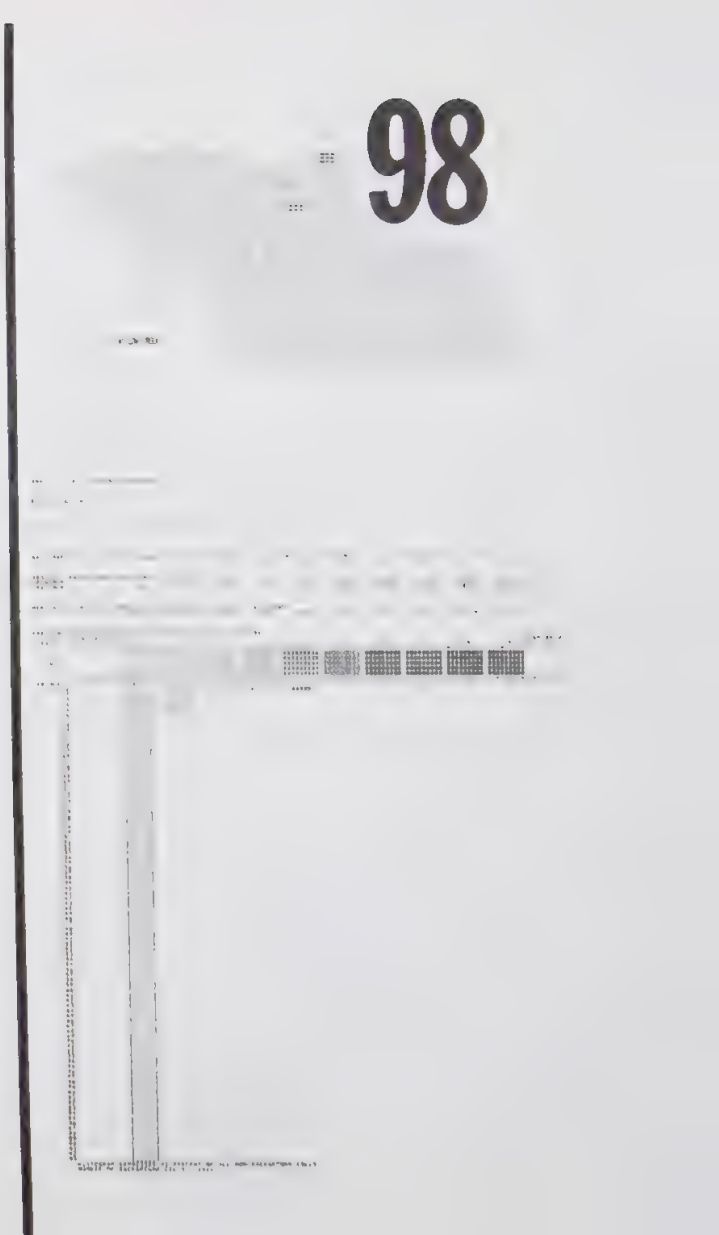
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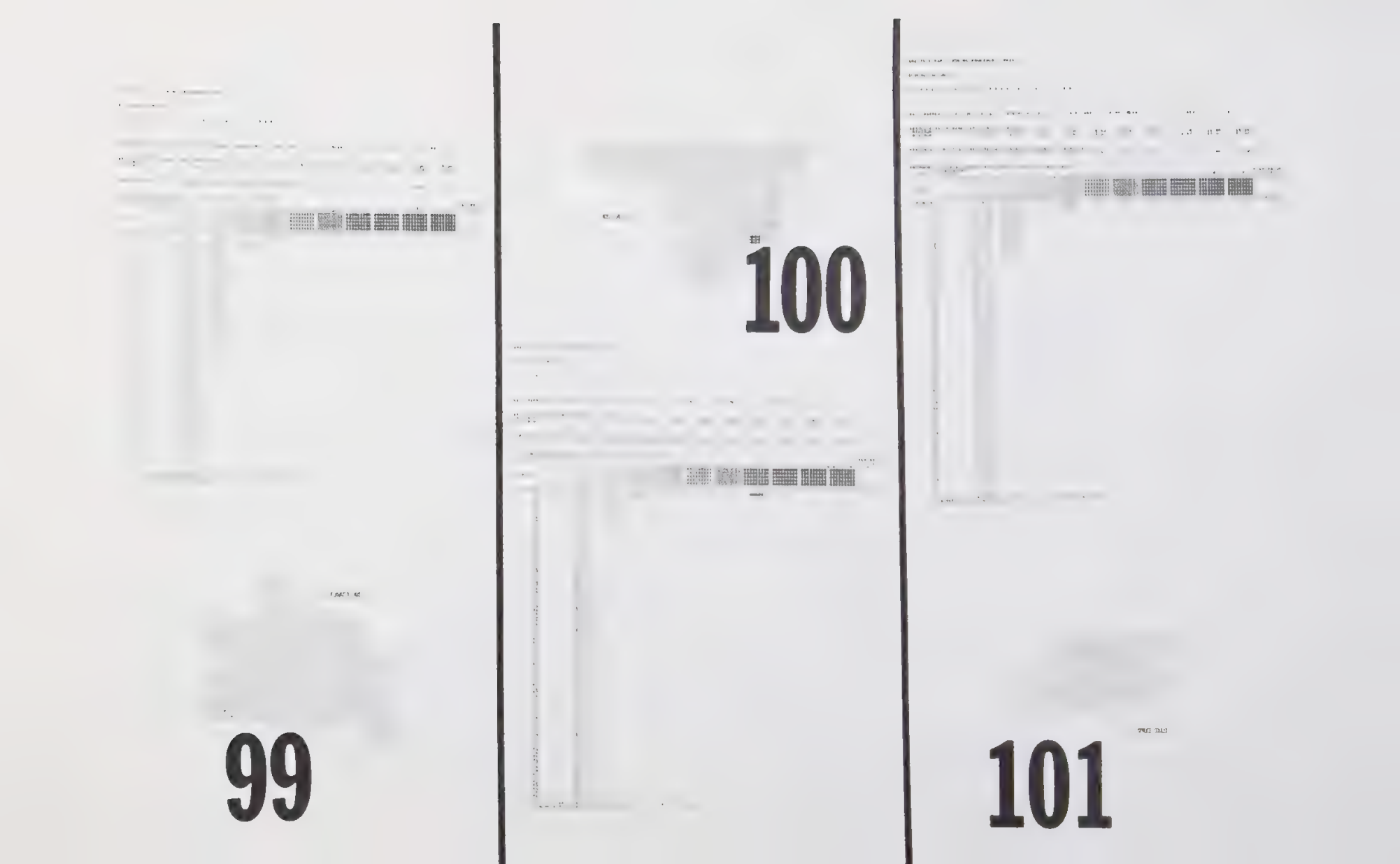
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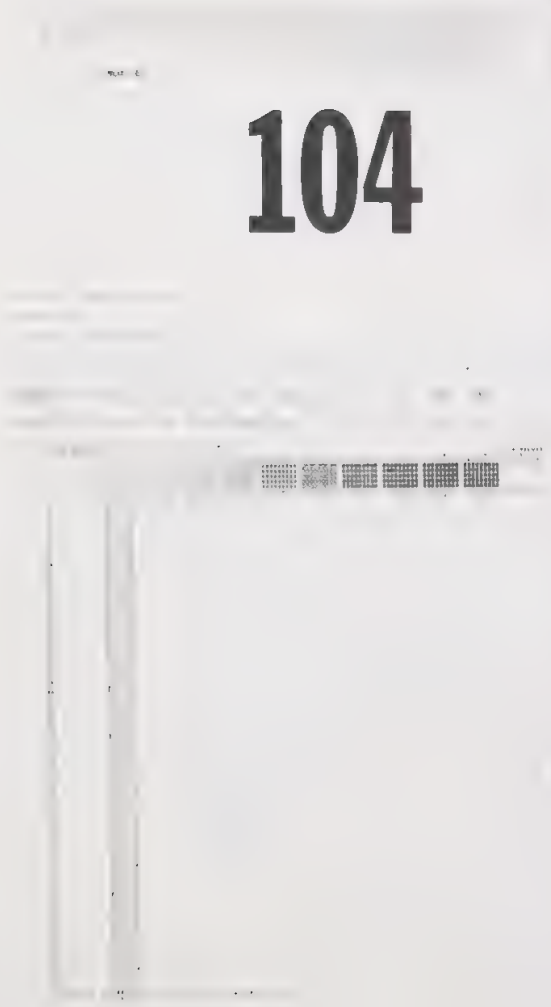
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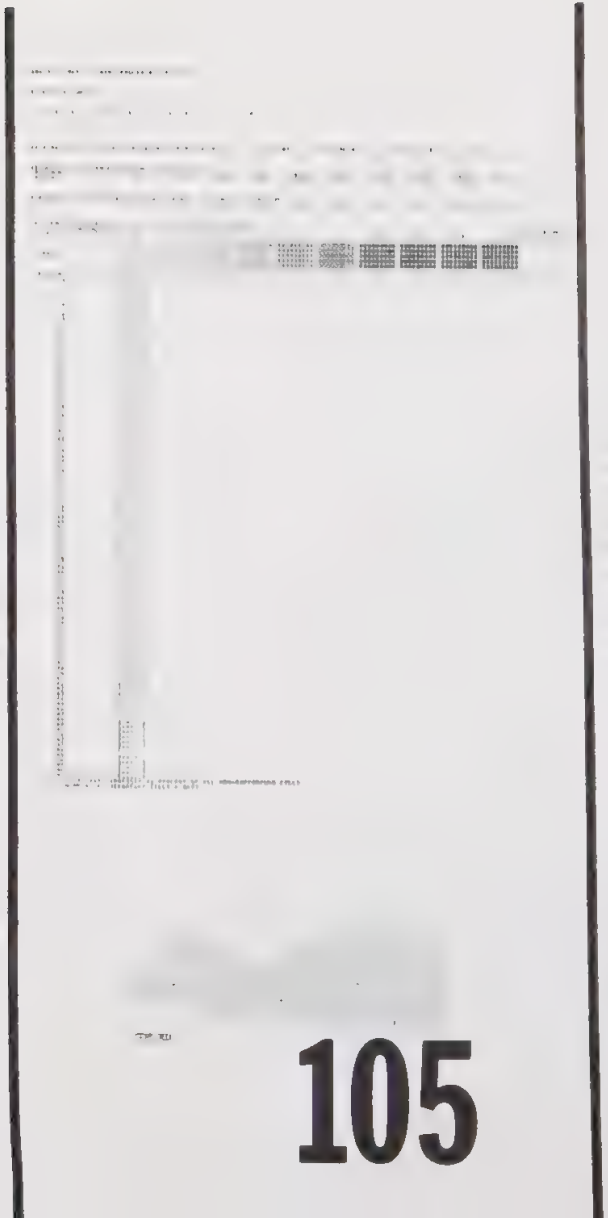
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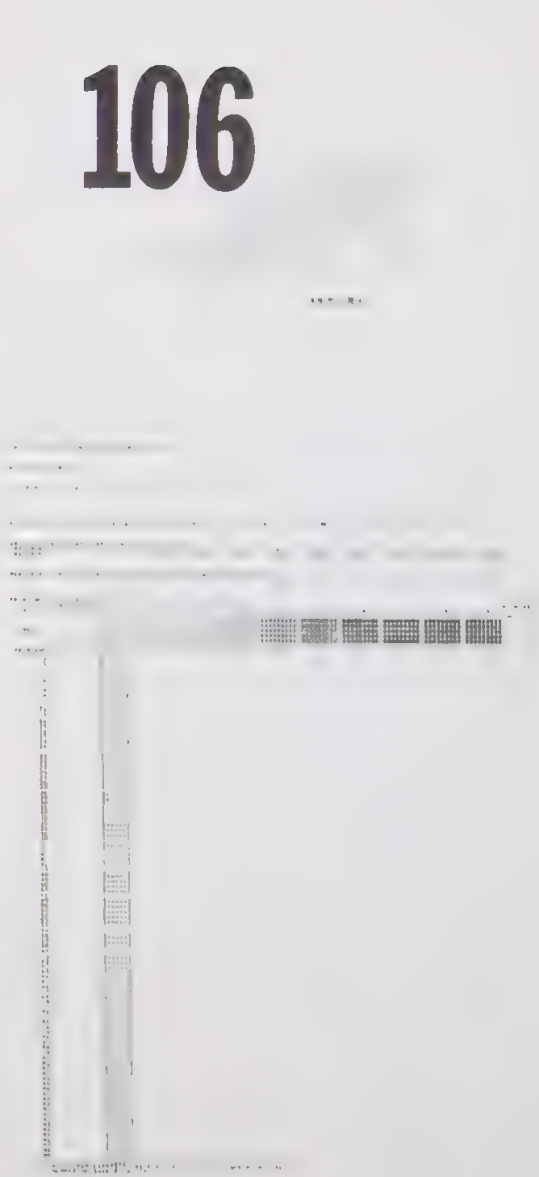
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Ecological Zones

Determination of Zones

After the 14 watersheds were rated (as shown in Table 1) the values given under the individual criteria were totaled. These totals were then used to generate a seven level map using the computer. Seven levels or classes were felt to be a workable number of zones. This map gave the final ecological zoning for the Park.

Ecological Zoning Plan

A simple addition of the ratings in Table 1 produces a seven level distribution of zones. The zones are displayed on Map 107. The final results were as follows:

Class I	(I)	Spruce Coulee
Class II	(J,L)	Battle Creek, Graburn Creek
Class III	(H,M,N)	Ross Creek, Storm Creek, Nine Mile Creek
Class IV	(A,G,K)	Bullshead Creek, Elkwater Lake, MacKay Creek
Class V	(B)	Lodge Creek
Class VI	(C)	Gros Ventre Creek
Class VII	(D,E,F)	Sexton Creek, Read Creek, Willow Creek

Class I	----------	Class VII
highest ecological value		lowest ecological value

Table 1.

Evaluation of Ecological Zones

Ecological Zone		Vegetation Diversity *	Ecological Uniqueness*	Undisturbed Character*	Total
Bullshead Creek	A	2	3	3	8
Lodge Creek	B	3	4	4	11
Gros Ventre Creek	C	4	4	4	12
Sexton Creek	D	3	5	5	13
Read Creek	E	3	5	5	13
Willow Creek	F	3	5	5	13
Elkwater Lake	G	5	2	1	8
Ross Creek	H	3	2	2	7
Spruce Coulee	I	3	1	1	5
Battle Creek	J	3	1	2	6
MacKay Creek	K	2	3	3	8
Graburn Creek	L	2	1	3	6
Storm Creek	M	1	4	2	7
Nine Mile Creek	N	1	3	3	7

* 1 ----- 5
best poorest

TABLE 2.

DIVERSITY

1 best ----- 5 poorest

Ecological Zone	Level (Percentage Occurance)							Rating	Description
	1	2	3	4	5	6	7		
A	47	20	19	13	2			2	Bullshead Creek
B	52	22	19	7	2			3	Lodge Creek
C	59	17	19	6	1			4	Gros Ventre Creek
D	70	15	14	2				3	Sexton Creek
E	91	8	2					3	Read Creek
F	70	19	10	2	1			3	Willow Creek
G	26	29	29	13	3	1		5	Elkwater Lake
H	35	22	19	19	5	2		3	Ross Creek
I	19	28	28	22	2	1		3	Spruce Coulee
J	42	25	20	12	2	1		3	Battle Creek
K	54	27	14	4	1		1	2	MacKay Creek
L	48	28	16	9	2	1		2	Graburn Creek
M	37	29	22	14	3			1	Storm Creek
N	42	26	16	10	7	1		1	Nine Mile Creek

ANALYSIS MAP ZONING PROCEDURE, PHASE 1

PARK ECOLOGICAL ZONING MAP

CYPRESS HILLS Provincial Park

SUITABILITY AND IMPACT ANALYSIS

Data Analysis Modelling

Matrix Format

As a means of outlining the data analysis for potential impacts and suitability - the two principal components of the analysis phase - a matrix format was employed. This format provides a method whereby the interaction between any data variable and a series of selected uses and/or activities may be analyzed on the basis of each individual interaction and is thus a means of examining many interactions in a manner in which specialists in various disciplines can easily participate in assessing the significance of these interactions.

Use of Analysis Mapping

The maps shown in the following section represents a "final" generation of maps resulting from a series of program runs where in each successive stage the data array was modified to eventually produce a reasonably even distribution of cells within a ten-level value display. These maps are then examined to determine the accuracy of the analysis presuming that if one or two groups of cells examined as a test group closely represents the values of an intuitive judgement by the various resource specialists, then the whole map is reasonably accurate for further use.

Subsequently, hypothetical alternative plans may be tested against the analysis maps.

Suitability Criteria

By suitability we meant attractiveness for a specific type of facility or activity. Suitability is concerned only with engineering and visual considerations. For example, a road which required excessive engineering maintenance (i.e. economic liability), was hazardous or was located in a visually "poor" area, and thus was used infrequently, would be considered to be situated in an unsuitable location. Conversely, if the reverse of the above conditions existed, then the road would be considered as suitably located. The suitability analysis is not concerned with impacts. A unique wildlife habitat or an archaeological site does not constrain a road or other such facility. These factors are environmental quality conditions which will be taken into consideration under the impact analysis phase.

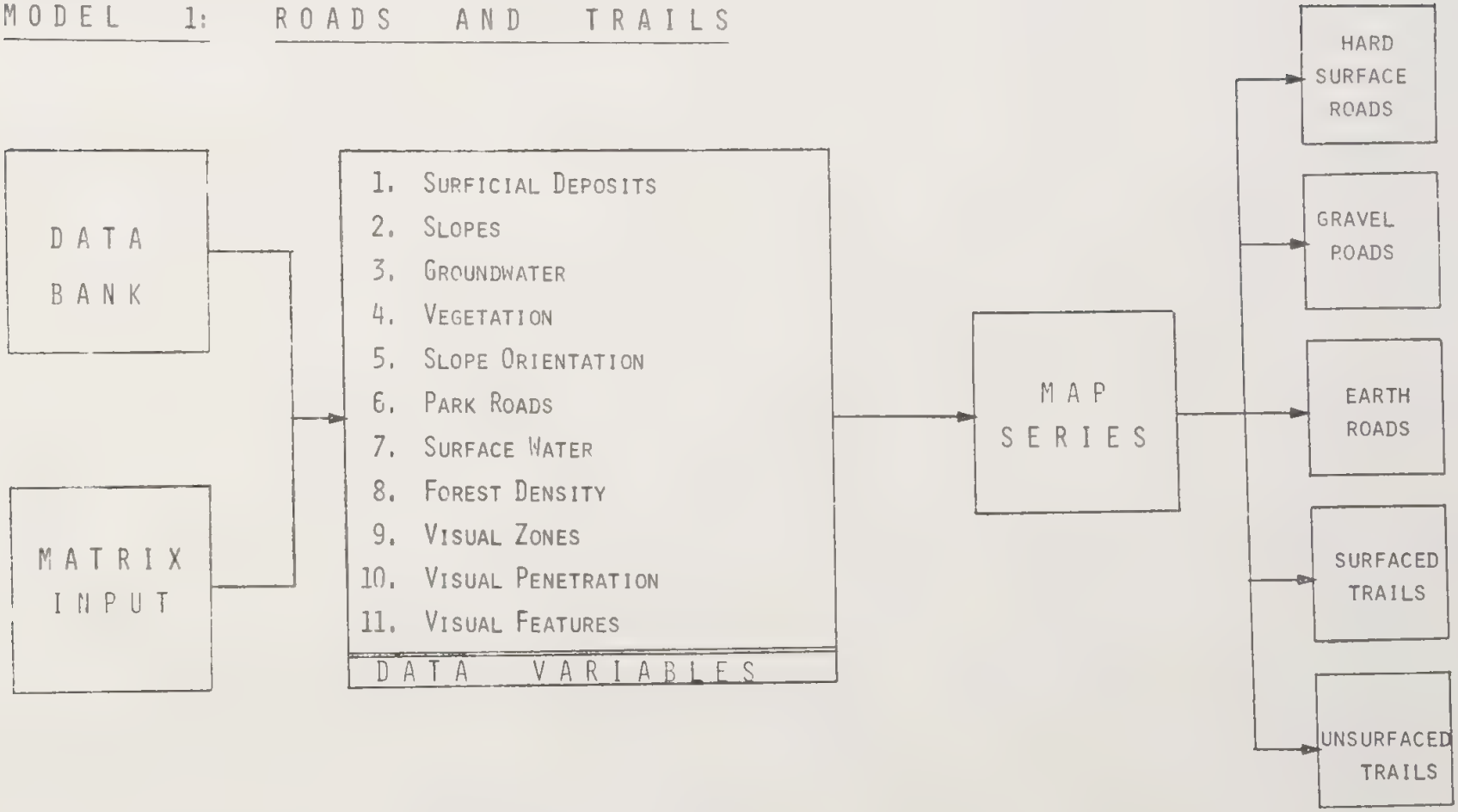
For each facility or activity there is a set of resource categories which have relevant interactions (see Model 1 and Model 2). These resource features vary in relative importance (see Relative Weightings for Suitability, Page 125) for specific uses. In addition, the relative importance of resource features within categories varies according to use of facility. For example, in analysis of the suitability of the various surficial deposits for hard surface roads, eroded slopes were determined to be the least suitable resource within this category, while meltwater channel deposits were judged to be the most suitable. (See Matrix - Suitability/Roads and Trails.) The level of detail required in order to make the important planning decisions in this study was such that maps were generated only for the major facilities - the major infrastructure of the Park. Should maps be required for the full range of other uses listed in the matrix sheets, these can easily be generated.

Information for areas outside the Park was incomplete. It is for this reason that cells outside the Park boundary show up as dark shading on the suitability maps (indicating low suitability), when in fact these are not necessarily highly unsuitable. However, the information within the Park boundary does not suffer from this bias.

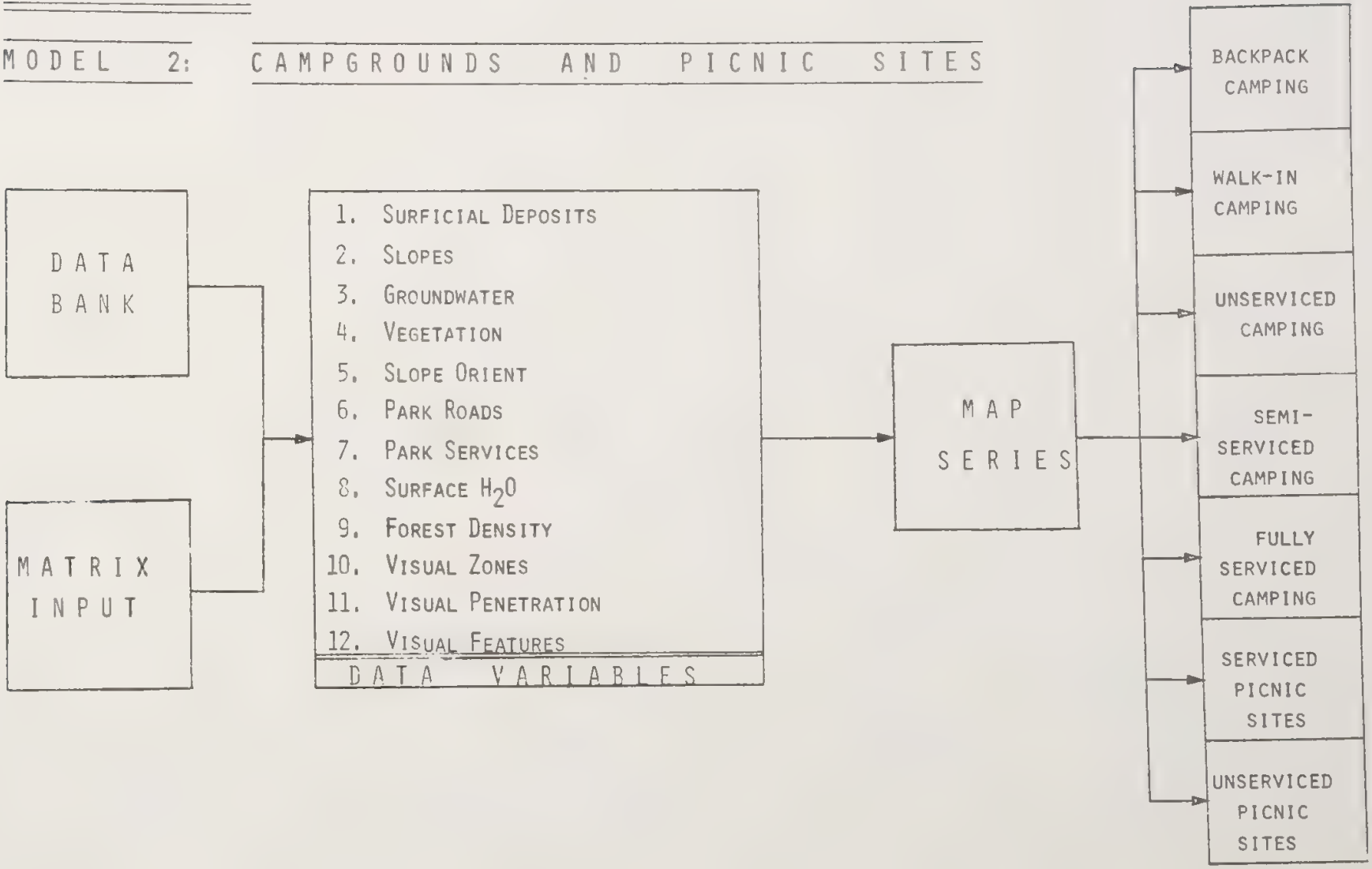
For definitions of the various types of facilities see the Inventory document.

SUITABILITY

MODEL 1: ROADS AND TRAILS



MODEL 2: CAMPGROUNDS AND PICNIC SITES



1 ---------- 9
low high
Suitability

SUITABILITY FOR ROADS AND TRAILS

	Hard Surface Road	Gravel Road	Earth Road	Surfaced Trails	Unsurfaced Trails
SURFICIAL DEPOSITS:					
Alluvium	3	3	3	3	3
Eroded Slope (wooded)	1	1	1	1	1
Colluvium & Alluvial Fan	3	3	3	3	3
Meltwater Channel deposits	9	9	9	9	9
Outwash	9	9	9	9	9
Hummocky Moraine	5	5	5	7	5
Loess	3	3	1	5	1
Undifferentiated (veneer on bedrock)	7	7	7	7	7
SLOPES:					
0 to 2%	9	9	9	9	9
2 to 5%	7	7	7	7	7
5 to 10%	3	3	3	3	3
greater than 10%	1	1	1	1	1
0to 2 or 2 to 5 and 5 to 10 or greater than 10%	1	1	1	1	1
GROUNDWATER:					
Major Aquifer	5	5	5	5	5
Minor Aquifer	3	3	3	5	5
Major Recharge Area	3	3	3	3	3
Minor Recharge Area	3	3	3	3	3
VEGETATION:					
Aspen	5	5	5	5	5
Spruce	5	5	5	5	5
Pine	5	5	5	5	5
Mixed	5	5	5	5	5
Marsh/Wet Meadow	1	1	1	1	1
Valley Bottom Grass/ Shrub	5	5	5	1	1
Willow/Currant/Cow Parsnip	3	3	3	3	3
Willow/Sedge	1	1	1	1	1
Mixed Grassland	5	5	5	5	5
Fescue Grassland	5	5	5	5	5
Grassland/Shrubland	5	5	5	5	5
Shrubland	5	5	5	5	5
Aspen Groveland	5	5	5	5	5

Suitability for Roads and Trails continued

	Hard Surface Road	Gravel Road	Earth Road	Surfaced Trails	Unsurfaced Trails
SLOPE ORIENTATION:					
Flat	5	5	5	5	5
South	9	7	7	4	4
Southeast	7	5	5	5	5
Southwest	9	7	7	7	7
North	3	3	3	3	3
Northeast	3	3	3	3	3
Northwest	5	5	5	5	5
East	5	5	5	5	5
West	7	7	7	7	7
PARK ROADS:					
Hard Surface	5				
Gravel	1				
Earth	3	1			
WATERBODIES:	----------Dropout----------				
FOREST DENSITY:					
00 None	9	9	9	7	7
01 Sparce	7	7	7	5	5
02 Moderate	5	5	5	5	5
03 Dense	3	3	3	3	3
04 Very Dense	1	1	1	3	3
VISUAL ZONES: (non-forest)					
Open Water	9	9	9	9	9
Marsh	7	7	7	7	7
Slope w/ Grass or Shrub	5	5	5	5	5
Valley Bottom w/ Grass or Shrub	3	3	3	3	3
Plateau w/ Grass or Shrub	3	3	3	3	3
Developed Area (Forest)	1	1	1	1	1
Slope w/ Aspen Grove	9	9	9	9	9
Slope w/ Deciduous	7	7	7	7	7
Slope w/ Coniferous	7	7	7	7	7
Slope w/ Mixed Forest	7	7	7	7	7
Valley Bottom w/ Aspen Groveland	7	7	7	7	7
Valley Bottom w/ Deciduous	5	5	5	5	5

Suitability for Roads and Trails continued

	Hard Surface Road	Gravel Road	Earth Road	Surfaced Trails	Unsurfaced Trails
Visual Zones continued					
Valley Bottom w/ Coniferous	5	5	5	5	5
Valley Bottom w/ Mixed Forest	5	5	5	5	5
Plateau w/ Aspen Groveland	5	5	5	5	5
Plateau w/ Deciduous	3	3	3	3	3
Plateau w/ Coniferous	3	3	3	3	3
Plateau w/ Mixed	3	3	3	3	3
VISUAL PENETRATION:					
Very Low	3	3	3	3	3
Low	5	5	5	5	5
Moderate	9	9	9	9	9
High	5	5	5	5	5
Very High	1	1	1	1	1
VISUAL FEATURES:					
.GT. 2 Negative	1	1	1	1	1
2 Negative Features	1	1	1	1	1
1 Negative Feature	3	3	3	3	3
None/Uncoded	5	5	5	5	5
1 Positive Feature	7	7	7	7	7
2 Positive Features	9	9	9	9	9
.GT. 2 Positive	9	9	9	9	9

SUITABILITY FOR CAMPGROUNDS AND PICNIC GROUNDS

	I. Backpack Camping	II. Walk-in Campground	III. Unserviced Campground	IV. Semi-Serviced Campground	V. Fully Serviced Campground	Serviced Picnic Ground	Unserviced
SURFICIAL DEPOSITS:							
Alluvium	5	3	3	1	1	1	3
Eroded Slope (wooded)	5	1	1	1	1	1	1
Colluvium & Alluvial Fan	5	3	3	3	1	3	3
Meltwater Channel Deposits	5	5	9	9	9	9	9
Outwash	5	5	9	9	9	9	9
Hummocky Moraine	5	5	7	7	7	7	7
Loess	5	3	3	3	1	3	3
Undifferentiated (veneer or bedrock)	5	5	5	5	5	5	5
SOILS:							
Fine/Organic	5	3	1	1	1	1	1
Fine	5	5	3	3	1	3	3
Medium	5	5	5	5	7	5	5
Coarse	5	5	7	7	9	7	7
SLOPES:							
0 to 2%	5	5	5	7	9	9	7
2 to 5%	5	5	5	5	5	7	5
5 to 10%	5	5	3	3	3	3	3
greater than 10%	3	3	1	1	1	1	1
(0-2) or)2-5) and (5-10) or greater than 10	9	7	3	1	1	1	1
GROUNDWATER:							
Other							
Major Aquifer	5	5	5	7	9	9	5
Minor Aquifer	5	5	5	7	7	7	5
Major Recharge Area	5	5	5	5	5	5	5
Minor Recharge Area	5	5	5	5	5	5	5
Spring	5	7	9	9	9	9	9
Well	5	5	7	9	9	9	5

Suitability for Campgrounds and Picnic Grounds continued

	I. Backpack Camping	II. Walk-in Campground	III. Unserviced Campground	IV. Semi-Serviced Camp-Ground	V. Fully Serviced Camp-ground	Serviced Picnic Ground	Unserviced
VEGETATION:							
Aspen	5	5	5	5	5	5	5
Spruce	5	5	5	5	5	5	5
Pine	5	5	5	5	5	5	5
Mixed	5	5	5	5	5	5	5
Marsh/Wet Meadow	3	3	3	1	1	1	3
Valley Bottom Grass/Shrub	5	5	5	5	5	5	5
Willow/Currant/Cow Parsnip	3	3	3	1	1	1	3
Willow/Sedge	3	3	3	1	1	1	3
Mixed Grassland	5	5	5	5	5	5	5
Fescue Grassland	5	5	5	5	5	5	5
Grassland/Shrubland	5	5	5	5	5	5	5
Shrubland	5	5	5	5	5	5	5
Aspen Groveland	5	5	5	5	5	5	5
ARCHAEOLOGY:							
Major Sites	5	9	9	9	9	9	9
Minor Sites	5	7	7	7	7	7	7
SLOPE ORIENTATION:							
Flat	5	5	5	5	5	5	5
South	5	9	9	9	9	9	9
Southeast	5	5	5	5	5	5	5
Southwest	5	9	9	9	9	9	9
North	5	1	1	1	1	1	1
Northeast	5	1	1	1	1	1	1
Northwest	5	3	3	3	3	3	3
East	5	5	5	7	7	5	5
West	5	7	7	7	7	7	7
PARK ROADS:							
Hard Surface	5	9	9	9	9	9	9
Gravel	5	7	7	7	7	7	7
Earth	5	3	3	5	3	3	3

Suitability for Campgrounds and Picnic Grounds continued

	I. Backpack Camping	II. Walk-In Campground	III. Unserviced Campground	IV. Semi-Serviced Campground	V. Fully Serviced Campground	Serviced Picnic Ground	Unserviced
PARK SERVICES:							
Watermain	5	5	5	9	9	9	5
Well	5	5	5	9	9	9	5
Spring	7	7	7	9	9	9	7
WATERBODIES:							
Major water body in Watershed G	7	7	7	5	5	5	7
Watershed I	7	7	7	5	5	5	7
Watershed J	7	7	7	5	5	5	7
STREAMS:							
Watershed A	9	9	9	9	9	9	9
Watershed B	9	9	9	9	9	9	9
Watershed C	9	7	9	9	9	9	9
Watershed D	9	9	9	9	9	9	9
Watershed E	9	9	9	9	9	9	9
Watershed F	9	9	9	9	9	9	9
Watershed G	9	3	3	1	9	1	3
Watershed H	9	9	9	9	9	9	9
Watershed I	9	9	9	9	9	9	9
Watershed J	9	9	9	9	9	9	9
Watershed K	9	9	9	9	9	9	9
Watershed L	9	3	3	1	9	1	3
Watershed M	9	3	3	1	9	1	3
Watershed N	9	3	3	1	9	1	3
FOREST DENSITY:							
None	5	5	5	5	5	5	5
Sparce	5	5	7	7	7	7	7
Moderate	5	5	5	5	5	5	5
Dense	3	3	3	3	3	3	3
Very Dense	3	3	3	1	1	1	3

Suitability for Campgrounds and Picnic Grounds continued

	I. Backpack CCamping	II. Walk-in Campground	III. Unserviced Campground	IV. Semi Serviced Camp-Ground	V. Fully Serviced Camp-ground	Serviced Picnic Ground	Unserviced
VISUAL ZONES: (non-forest)							
Open Water	9	9	9	9	9	9	9
Marsh	1	1	1	1	1	1	1
Slopes w/ Grass or Shrubland	3	3	3	3	3	3	3
Valley Bottom w/ Grass or Shrubland	5	5	5	5	5	5	5
Plateau w/ Grass or Shrubland	1	1	1	1	1	1	1
Developed	1	1	1	1	1	1	1
(forest)							
Slopes w/ Aspen Groveland	3	3	3	3	3	9	9
Slopes w/ Deciduous	3	3	3	3	3	7	7
Slopes w/ Coniferous	5	5	5	5	5	7	7
Slopes w/ Mixed	3	3	3	3	3	7	7
Valley Bottom w/ Aspen Groveland	9	9	9	9	9	7	7
Valley Bottom w/ Deciduous	5	5	5	5	5	5	5
Valley Bottom w/ Coniferous	7	7	7	7	7	5	5
Valley Bottom w/ Mixed	7	7	7	7	7	5	5
Plateau w/ Aspen Groveland	7	7	7	7	7	5	5
Plateau w/ Deciduous	3	3	3	3	3	3	3
Plateau w/ Coniferous	5	5	5	5	5	3	3
Plateau w/ Mixed	5	5	5	5	5	5	5
VISUAL PENETRATION:							
Very Low	7	7	7	7	7	1	1
Low	9	9	9	9	9	3	5
Moderate	7	7	7	7	7	9	9
High	3	3	3	5	5	7	5
Very High	1	1	1	1	3	1	1
VISUAL FEATURES:							
.GT. 2 negative	1	1	1	1	1	1	1
2 negative	1	1	1	1	1	1	1
1 negative	1	1	1	1	3	1	1
None	5	5	5	5	5	5	5
1 positive	7	7	7	7	7	7	7
2 positive	9	9	9	9	9	9	9
.GT. 2 positive	9	9	9	9	9	9	9

SUITABILITY FOR WATER-ORIENTED RECREATIONAL USES

	Boating (Sail)	Boating (Canoes, etc.)	Boating (High Power)	Boating (Low Power)	Fishing (Improved)	Fishing (Unimproved)	Water Skiing	Swimming
SOILS:								
Fine/Organic	1	3	1	1	5	5	1	5
Fine	3	5	3	3	5	5	3	7
Medium	5	5	5	5	5	5	5	5
Coarse	7	5	7	7	7	5	7	3
SLOPES:								
0 to 2%	7	5	7	7	7	5	7	5
2 to 5%	5	5	5	5	7	5	5	5
5 to 10%	5	5	5	5	3	5	5	5
.GT. 10%	1	3	1	1	3	5	1	3
0-2 or 2-5 and 5-10 or .GT. 10	3	3	3	3	3	3	3	3
PARK ROADS:								
Hard Surface	9		9	9	7		9	9
Gravel	9		7	7	7		7	7
Earth	7		5	5	5		5	5
WATERBODIES:								
Major water body in Watershed G	7	7	9	9	5	3	9	9
Watershed I	1	9	3	5	7	5	1	3
Watershed J	1	9	5	7	7	5	1	5
STREAMS:								
Watershed A					1	1		
Watershed B					1	1		
Watershed C					1	1		
Watershed D					1	1		
Watershed E					1	1		
Watershed F					1	1		
Watershed G					1	3		
Watershed H					1	1		
Watershed I					1	3		
Watershed J					1	3		
Watershed K					1	1		
Watershed L					1	1		
Watershed M					1	1		
Watershed N					1	1		

Suitability for Water-Oriented Recreational Uses continued

	Boating (Sail)	Boating (Canoes, etc.)	Boating (High Power)	Boating (Low Power)	Fishing (Improved)	Fishing (Unimproved)	Water Skiing	Swimming	Ice Skating
VISUAL ZONES: (non-forest)									
Open Water	9	9	9	9	9	9	9	9	9
Marsh	1	7	1	3	3	5	1	1	3
Slopes w/ Grass or Shrubland	5	5	5	5	5	5	5	5	3
Valley Bottom w/ Grass or Shrubland	3	3	3	3	3	3	3	3	3
Plateau w/ Grass or Shrubland					3	3			1
Developed	1	1	9	3	1	1	9	7	3
(forest)									
Slopes w/ Aspen Groveland	9	9	9	9	9	9	9	9	7
Slopes w/ Deciduous	7	7	7	7	7	7	7	7	5
Slopes w/ Coniferous	7	7	7	7	7	7	7	7	7
Slopes w/ Mixed	9	9	9	9	9	9	9	9	7
Valley Bottom w/ Aspen Groveland	7	7	7	7	7	7	7	7	9
Valley Bottom w/ Deciduous	5	5	5	5	5	5	5	5	5
Valley Bottom w/ Coniferous	5	5	5	5	5	5	5	5	9
Valley Bottom w/ Mixed	7	7	7	7	7	7	7	7	7
Plateau w/ Aspen Groveland					5	5			9
Plateau w/ Deciduous					3	3			5
Plateau w/ Coniferous					5	5			9
Plateau w/ Mixed					5	5			9
VISUAL PENETRATION:									
Very Low	3	7	1	1	7	7	1	9	1
Low	7	9	3	7	9	9	3	7	3
Moderate	9	7	7	9	7	5	7	7	9
High	7	3	9	5	5	3	9	5	7
Very High	3	1	7	3	3	1	5	3	1
VISUAL FEATURES:									
.GT. 2 negative	1	1	1	1	1	1	1	1	1
2 negative	1	1	3	1	1	1	1	1	1
1 negative	3	3	5	3	3	1	3	1	1
None	5	5	5	5	5	5	5	5	5
1 positive	7	7	7	7	7	7	7	7	7
2 positive	9	9	9	9	9	9	7	9	9
.GT. 2 positive	9	9	9	9	9	9	9	9	9

SUITABILITY FOR VARIOUS RECREATIONAL USES

	Hiking	Bicyling	Horesback Riding	Cross Country Skiing	Motor Touring	Nature Observation	Nature Photography	Down Hill Skiing	Ice Skating
SOILS:									
Fine/Organic	3	5	3		3				
Fine	5	5	3		5				
Medium	7	5	5		7				
Coarse	1	5	7		9				
SLOPES:									
0 to 2%	9	9	5	9	5	5	5	1	
2 to 5%	9	9	5	9	5	5	5	1	
5 to 10%	7	7	5	7	5	5	5	3	
.GT. 10%	1	1	5	5	7	5	5	9	
0-2 or 2-5 and 5-10 or .GT. 10	5	5	5	5	;	5	5	5	
GROUNDWATER:									
Major Aquifer		5			5				
Minor Aquifer		5			5				
Major Recharge Area		5			5				
Minor Recharge Area		5			5				
Spring		3			1				
VEGETATION:									
Aspen						9			
Spruce						9			
Pine						9			
Mixed						9			
Marsh/Wet Meadow						9			
Valley Bottom Grass/Shrub						9			
Willow/Currant/Cow parsnip						9			
Willow/Sedge						9			
Mixed Grassland						9			
Fescue Grassland						9			
Grassland/Shrubland						9			
Shrubland						9			
Aspen Groveland						9			

Suitability for Various Recreational Uses continued

	Hiking	Bicyling	Horesback Riding	Cross Country Skiing	Motor Touring	Nature Observation	Nature Photography	Down Hill Skiing	Ice Skating
WILDLIFE:									
Moose Winter Range	--					9	9		
Elk Winter Range	--					9	9		
Deer Winter Range	--					9	9		
Raptor Nest Site	5					9	9		
Grasshopper Sparrow Nest Site	5					9	9		
Broad-winged Hawk Habitat	7					9	9		
Pied-billed Grebe Habitat	7					9	9		
MacGillivray's Warbler Habitat	5					9	9		
Beaver Habitat	9					9	9		
Mink Habitat	5					9	9		
ARCHAEOLOGY:									
Major Sites						9	9		
Minor Sites						7	7		
SLOPE ORIENTATION:									
South				3				3	
Southeast				5				5	
Southwest				3				3	
North				9				9	
Northeast				9				9	
Northwest				7				7	
East				7				7	
West				3				3	
WATERBODIES:									
Major Water Body in Watershed G	7	5	5	9		5	5		9
Watershed I	9	5		7		9	9		9
Watershed J	9	5		7		7	7		7
STREAMS:									
Watershed A	7				3		7		
Watershed B	7				3	7	7		
Watershed C	7				5	7	7		
Watershed D	7				3	7	7		
Watershed E	7				3	7	7		

	Hiking	Bicyling	Horesback Riding	Cross Country Skiing	Motor Touring	Nature Observation	Nature Photography	Down Hill Skiing	Ice Skating
Streams continued;									
Watershed F	9				5	9	9		
Watershed G	7				5	7	7		
Watershed H	7				5	7	7		
Watershed I	7				5	7	7		
Watershed J	9				7	9	9		
Watershed K	7				7	7	7		
Watershed L	9				5	9	9		
Watershed M	9				3	9	9		
Watershed N	9				3		9		
FOREST DENSITY:									
None	9	9	9	9	9			9	
Sparce	7	7	7	7	7			7	
Moderate	5	5	5	5	5			5	
Dense	3	3	3	3	3			3	
Very Dense	1	1	1	1	1			1	
VISUAL ZONES: (non-Forest)									
Open Water	9	9	9	9	9	9			9
Marsh	7	7	7	3	7	9			3
Slopes w/ Grass or Shrubland	5	5	5	7	5	7		9	
Valley Bottom w/ Grass or Shrubland	3	3	3	3	3	5			3
Plateau w/ Grass or Shrubland	3	3	3	3	3	3			3
Developed	1	1	1	1	1	1		1	1
(forest)									
Slopes w/ Aspen Groveland	9	9	9	9	9	9		5	
Slopes w/ Deciduous	7	7	7	5	7	7		3	
Slopes w/ Coniferous	7	7	7	7	7	5		7	
Slopes w/ Mixed	7	7	7	7	7	7		7	
Valley Bottom w/ Aspen Groveland	7	7	7	5	7	9			5
Valley Bottom w/ Deciduous	5	5	5	3	5	7			3
Valley Bottom w/ Coniferous	5	5	5	5	5	5			7
Valley Bottom w/ Mixed	5	5	5	5	5	5			7
Plateau w/ Aspen Groveland	5	5	5	5	5	7			3
Plateau w/ Deciduous	3	3	3	3	3	5			3
Plateau w/ Coniferous	3	3	3	3	3				5
Plateau w/ Mixed	3	3	3	3	3				5

Suitability for Various Recreational Uses continued

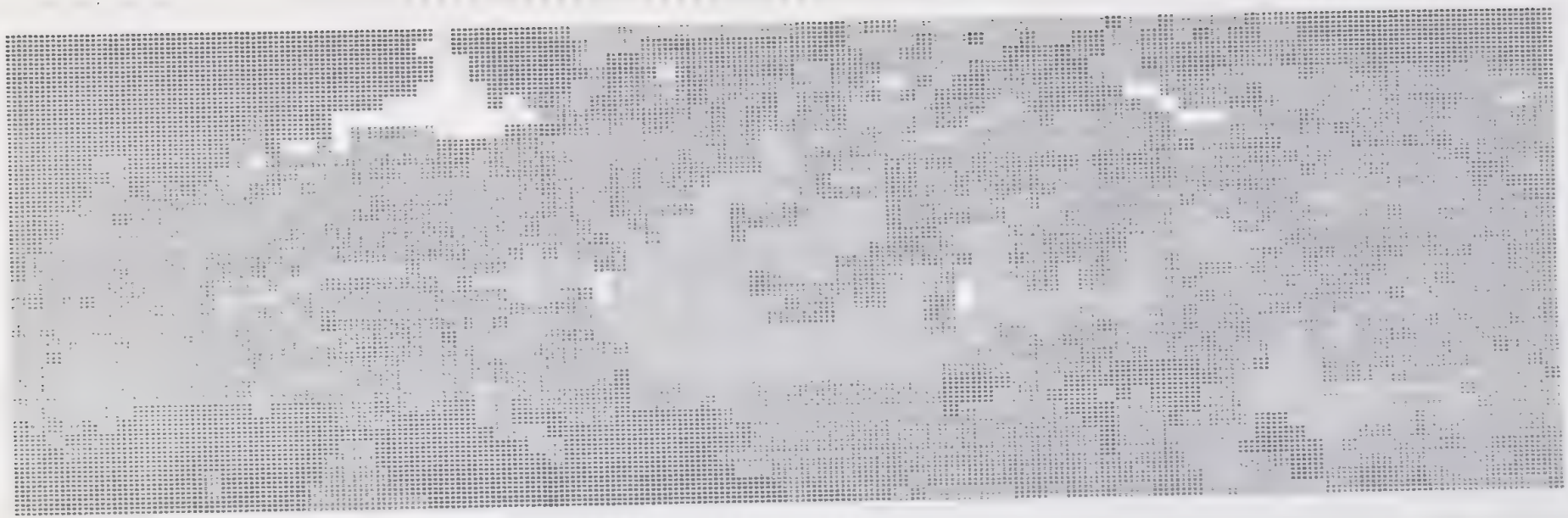
	Hiking	Bicyling	Horesback Riding	Cross Country Skiing	Motor Touring	Nature Observation	Nature Photography	Down Hill Skiing	Ice Skating
VISUAL PENETRATION:									
Very Low	9	3	3	5	3	1		1	7
Low	9	7	7	7	5	3		3	9
Moderate	9	9	9	9	9	5		5	5
High	3	5	5	5	5	9		9	3
Very High	1	1	1	1	1	7		7	7
VISUAL FEATURES:									
.GT. 2 negative	1	1	1	1	1	1		1	1
2 negative	1	1	1	1	1	1		3	3
1 negative	3	3	3	3	3	3		3	3
None	5	5	5	5	5	5		5	5
1 positive	7	7	7	7	7	7		7	7
2 positive	9	9	9	9	9	9		7	7
.GT. 2 positive	9	9	9	9	9	9		7	7

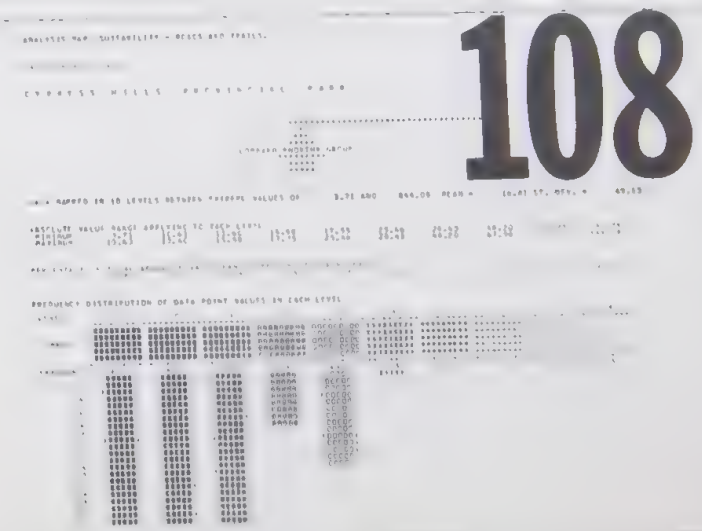
SUITABILITY - Relative Weighting of Categories

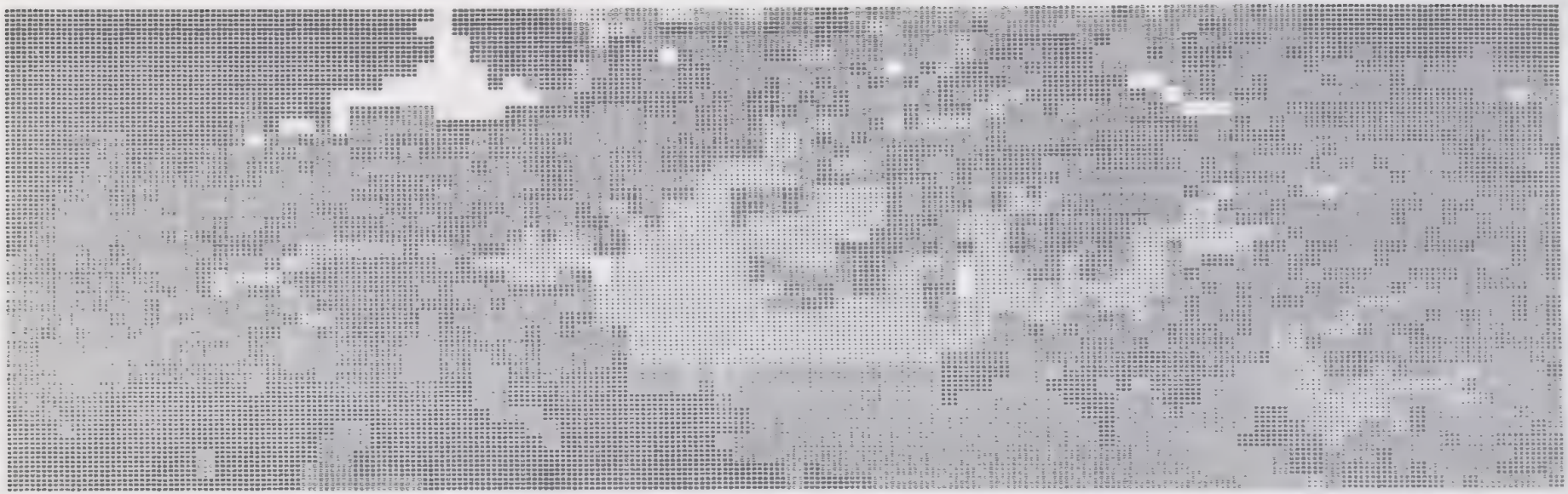
1 ---------- 4

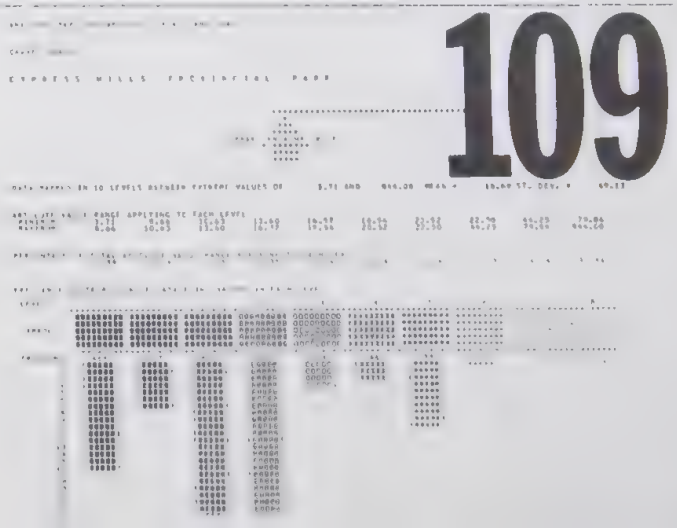
most heavily weighted — least heavily weighted

	Roads and Trails	Campgrounds and Picnics	Water Orient Fishing Skating	Water Orient Boating Swimming Water Skiing	Various Hiking Horseback Bicycling	Various Motor Touring	Various Skiing- Down Hill Cross Country	Various Nature Photographs Nature Observation
Surficial Geology	2	2	4					
Slopes	1	1	2	2	2		1	
Groundwater	4	3	4					
Vegetation	2	2						2
Wildlife					3			1
Archaeology					4			2
Slope Orientation	4	4	4	4			1	
Park Roads	4	2	3	2				
Park Facilities		2						
Major Water Body		1	1	1	3		4	3
Minor Water Body		3	2	4	3		4	3
Stream		3	1	4		3	3	2
Forest Density	4	3			3	2	2	
Visual	4	3	3	3	1	1	2	3





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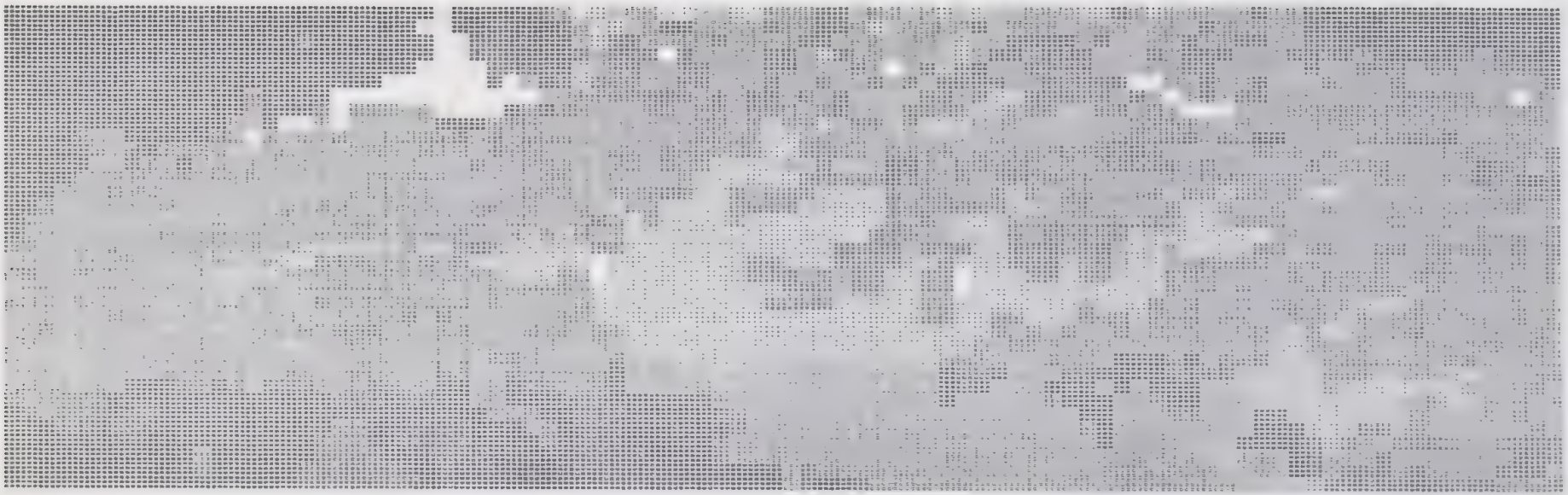

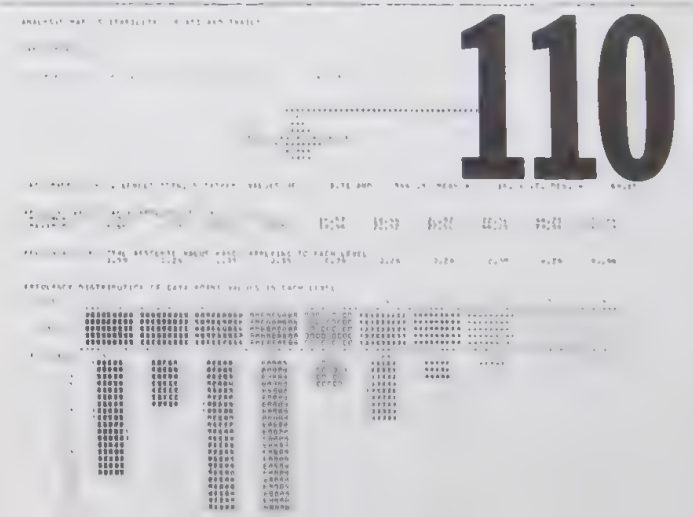
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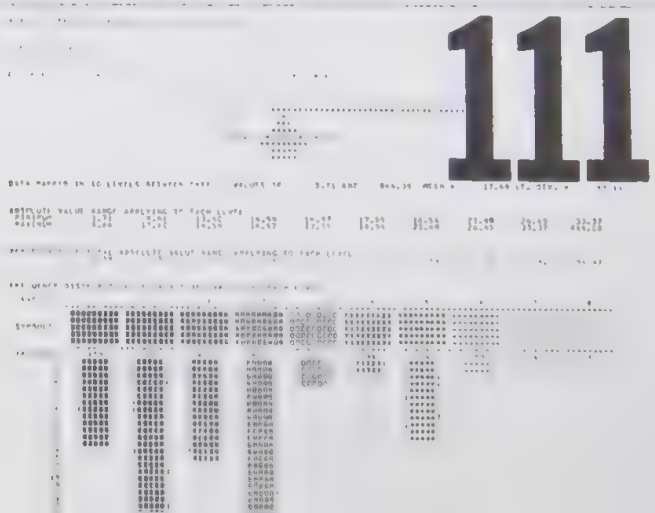
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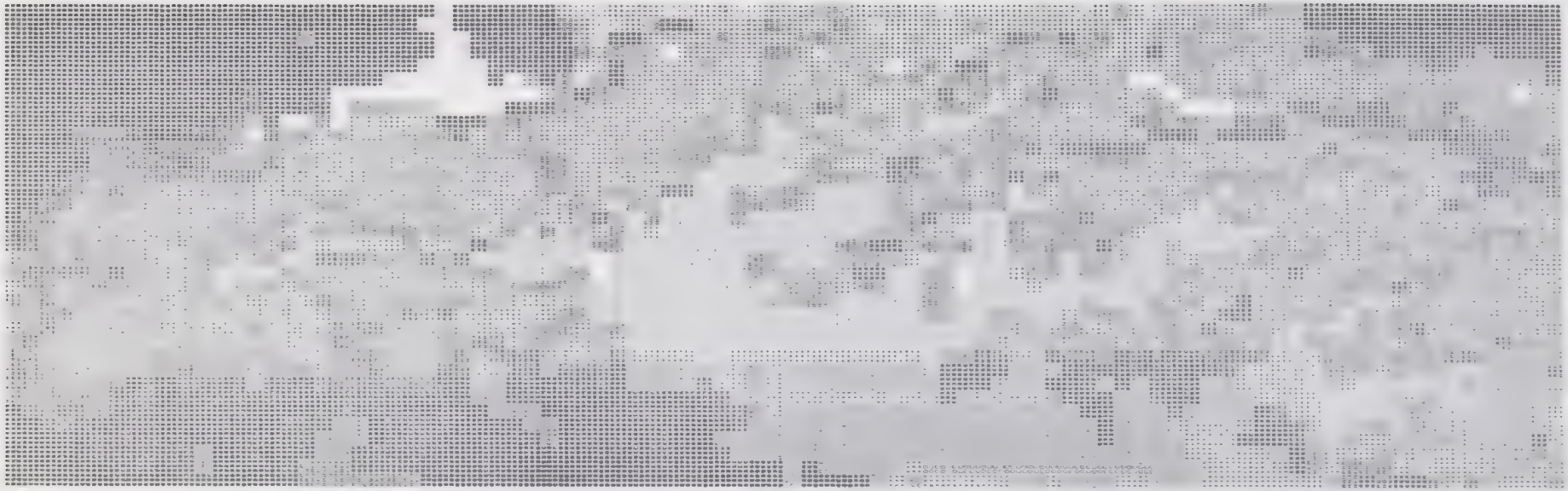

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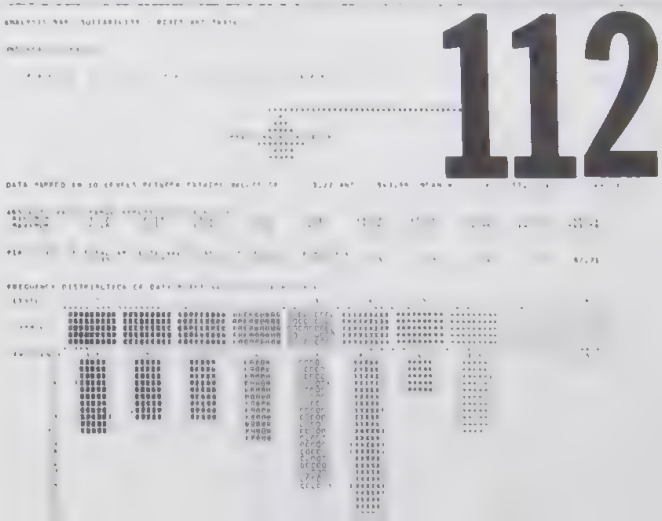

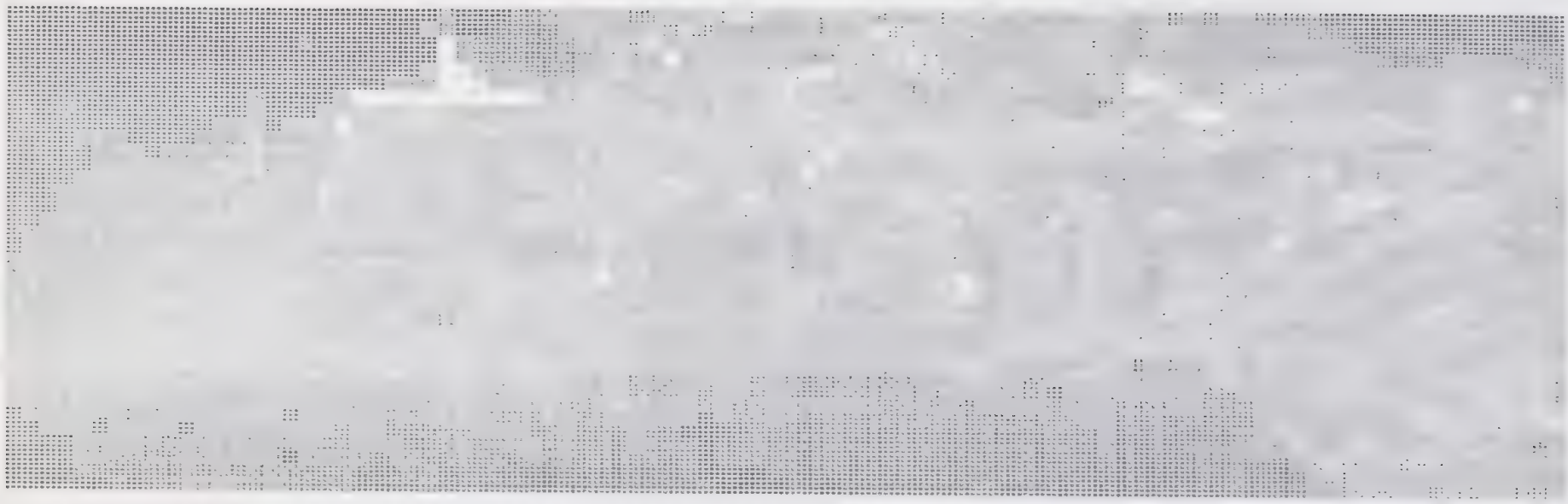

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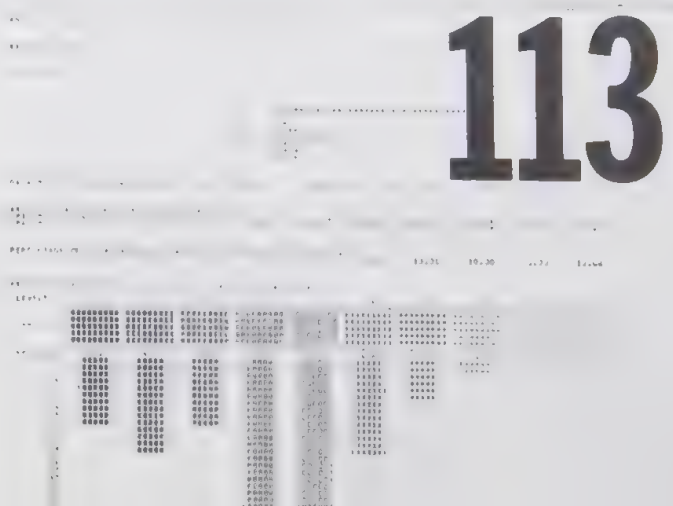

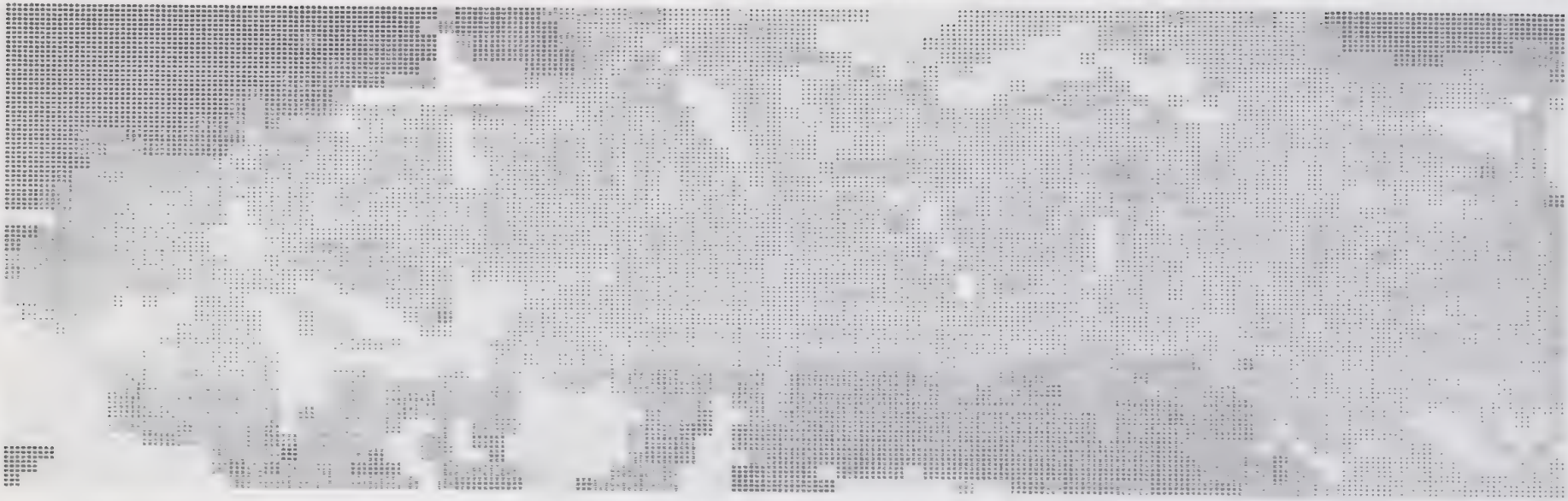

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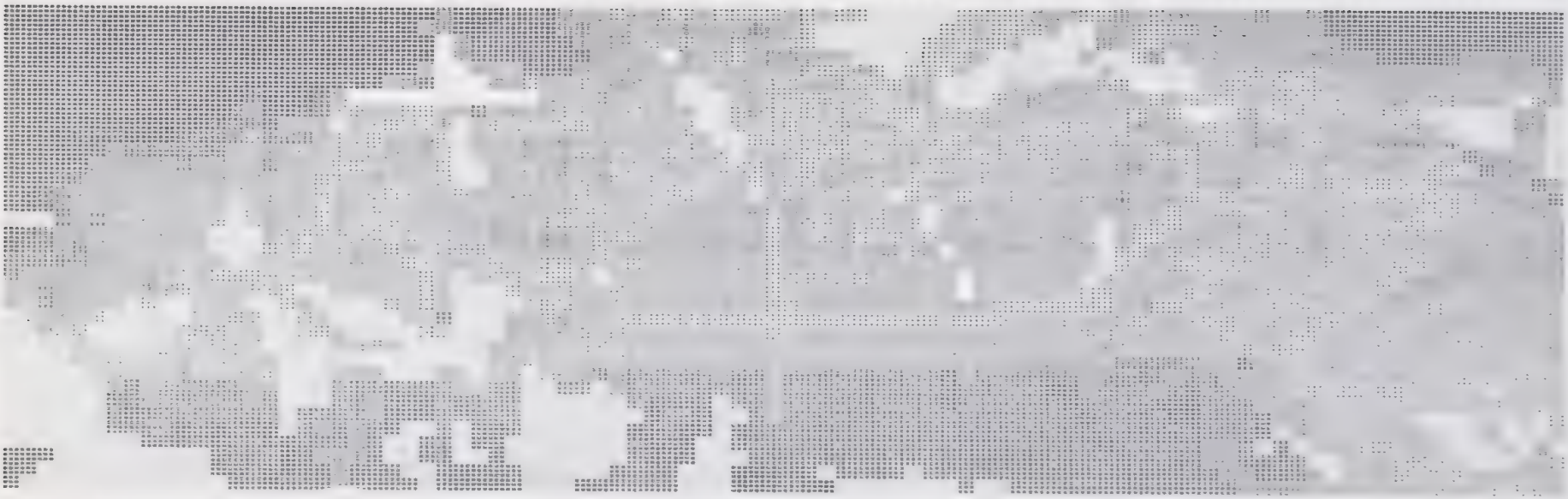

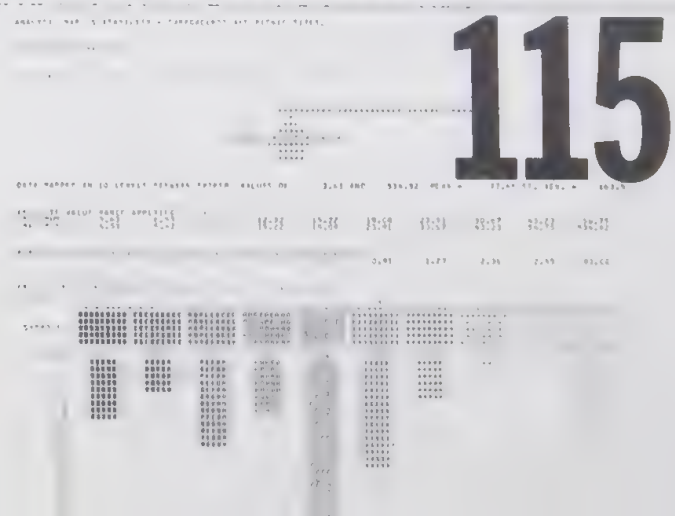

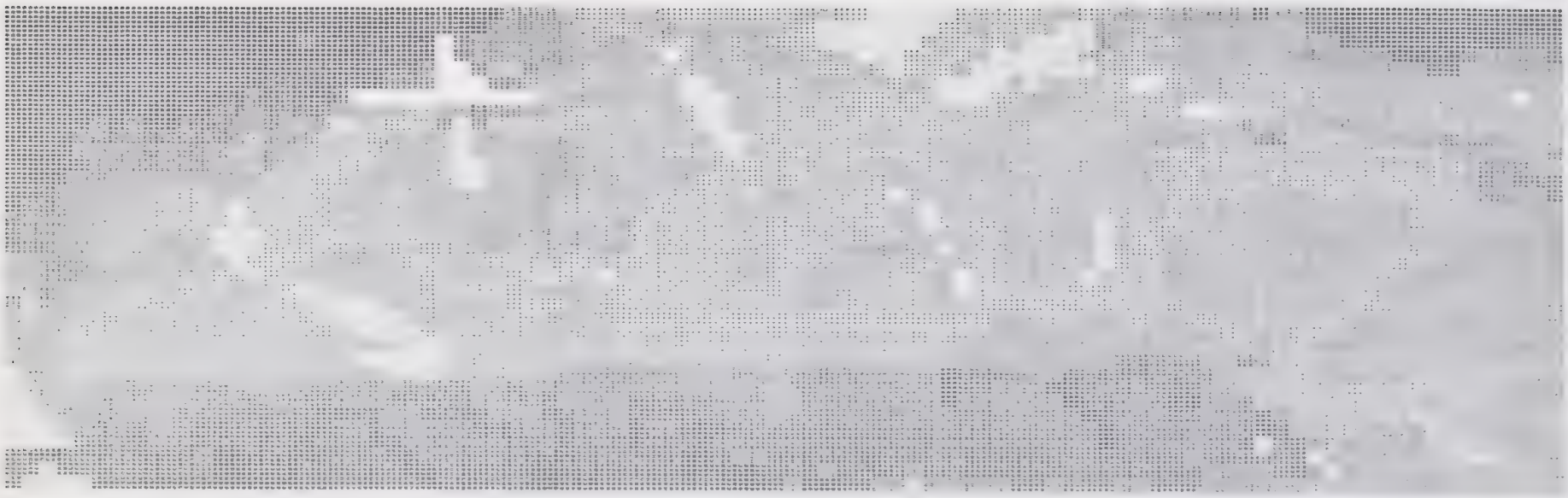

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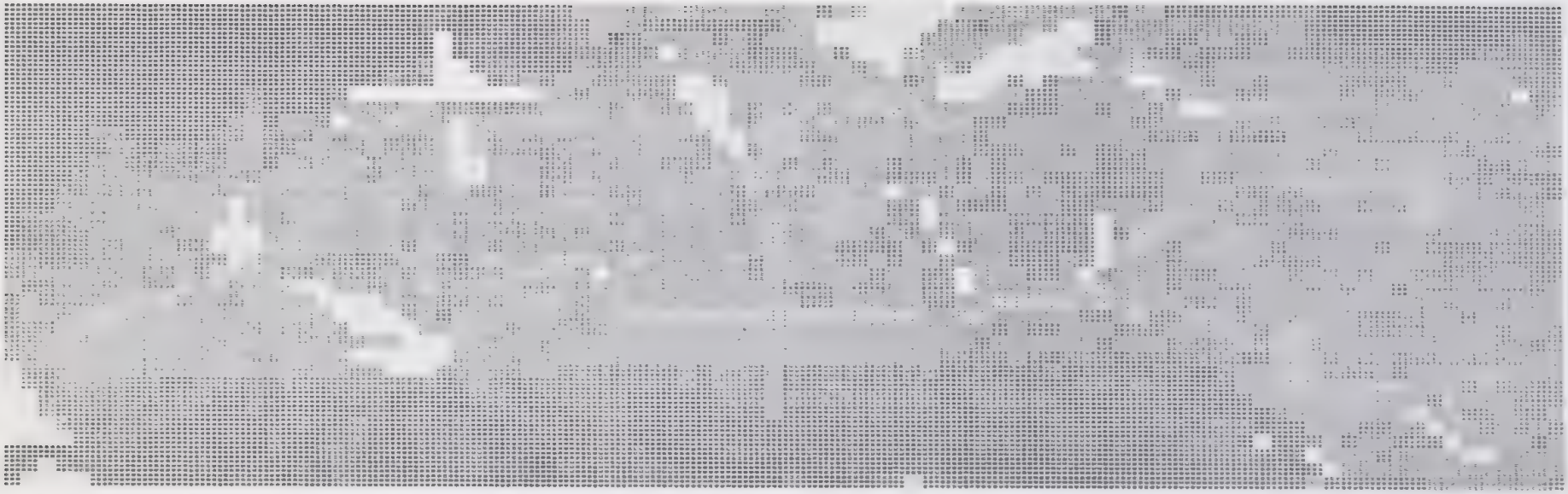
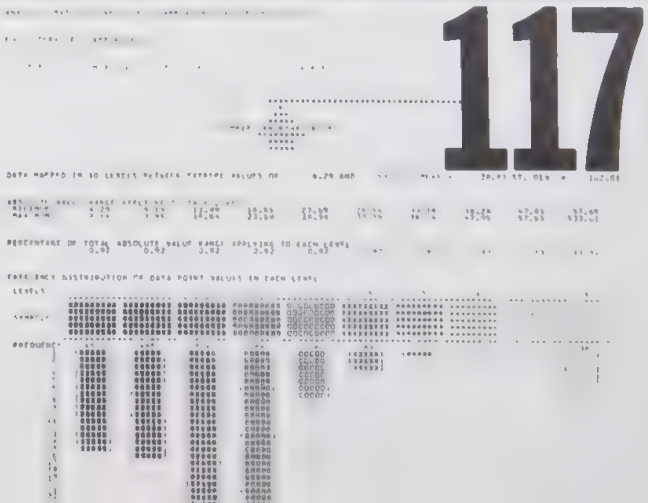
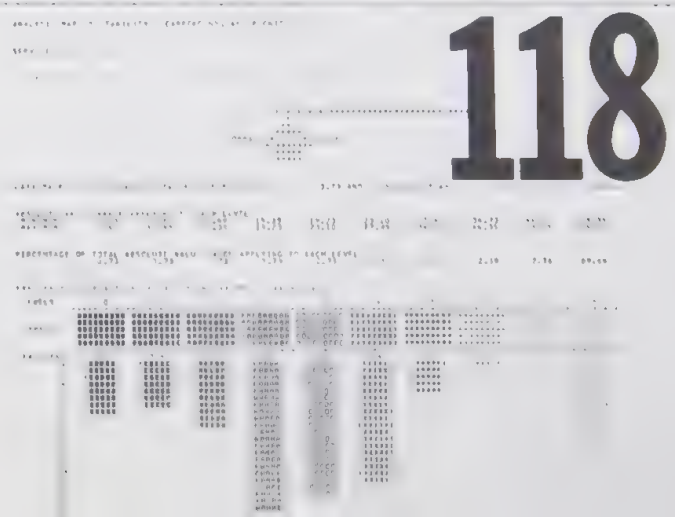
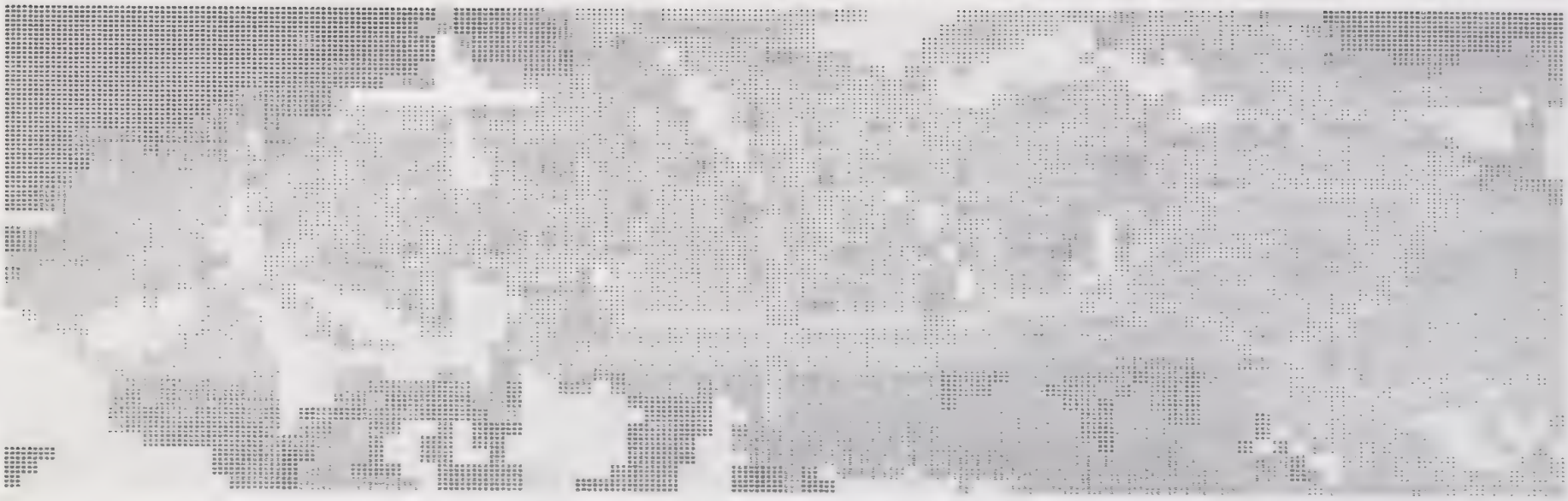






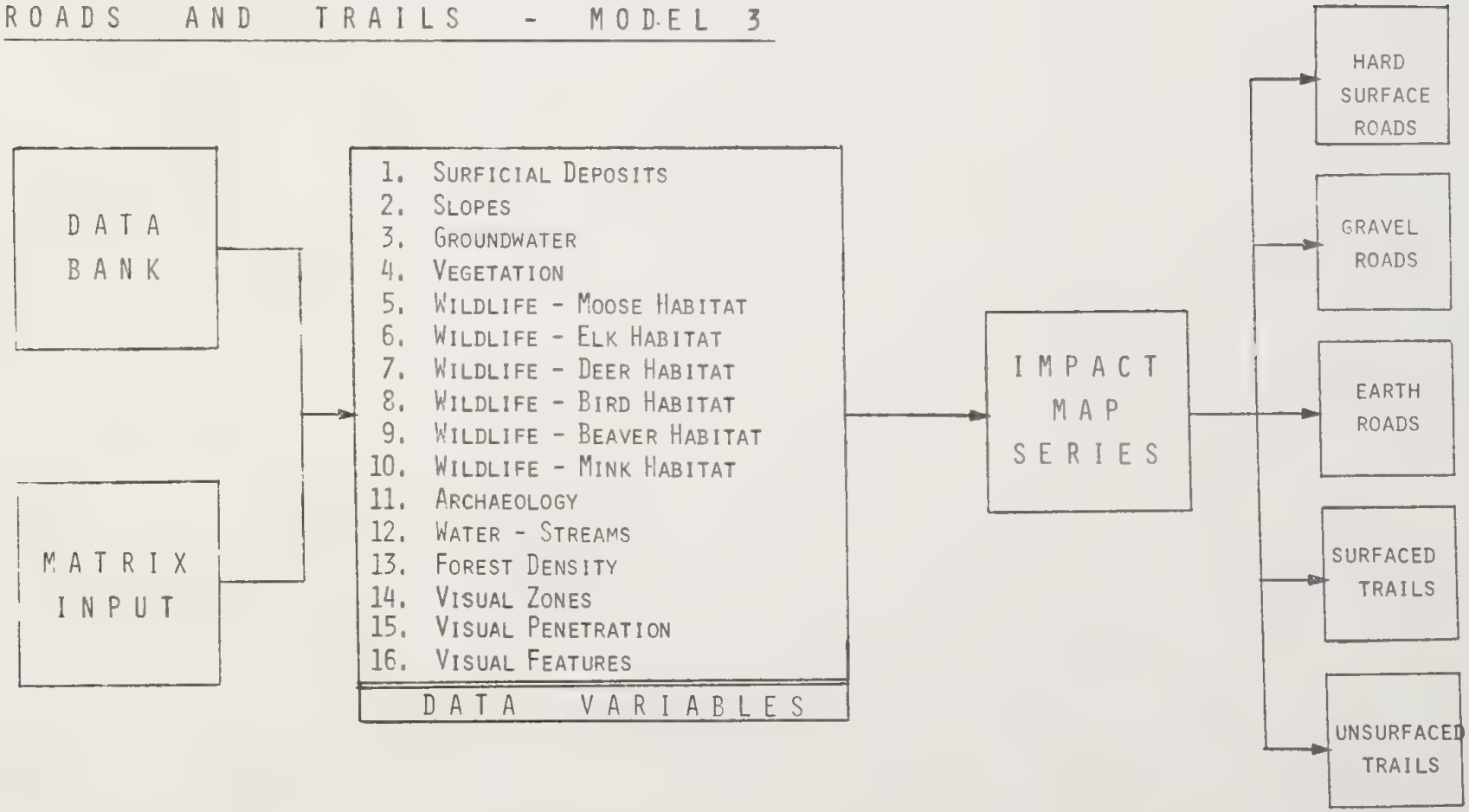


Impact Criteria

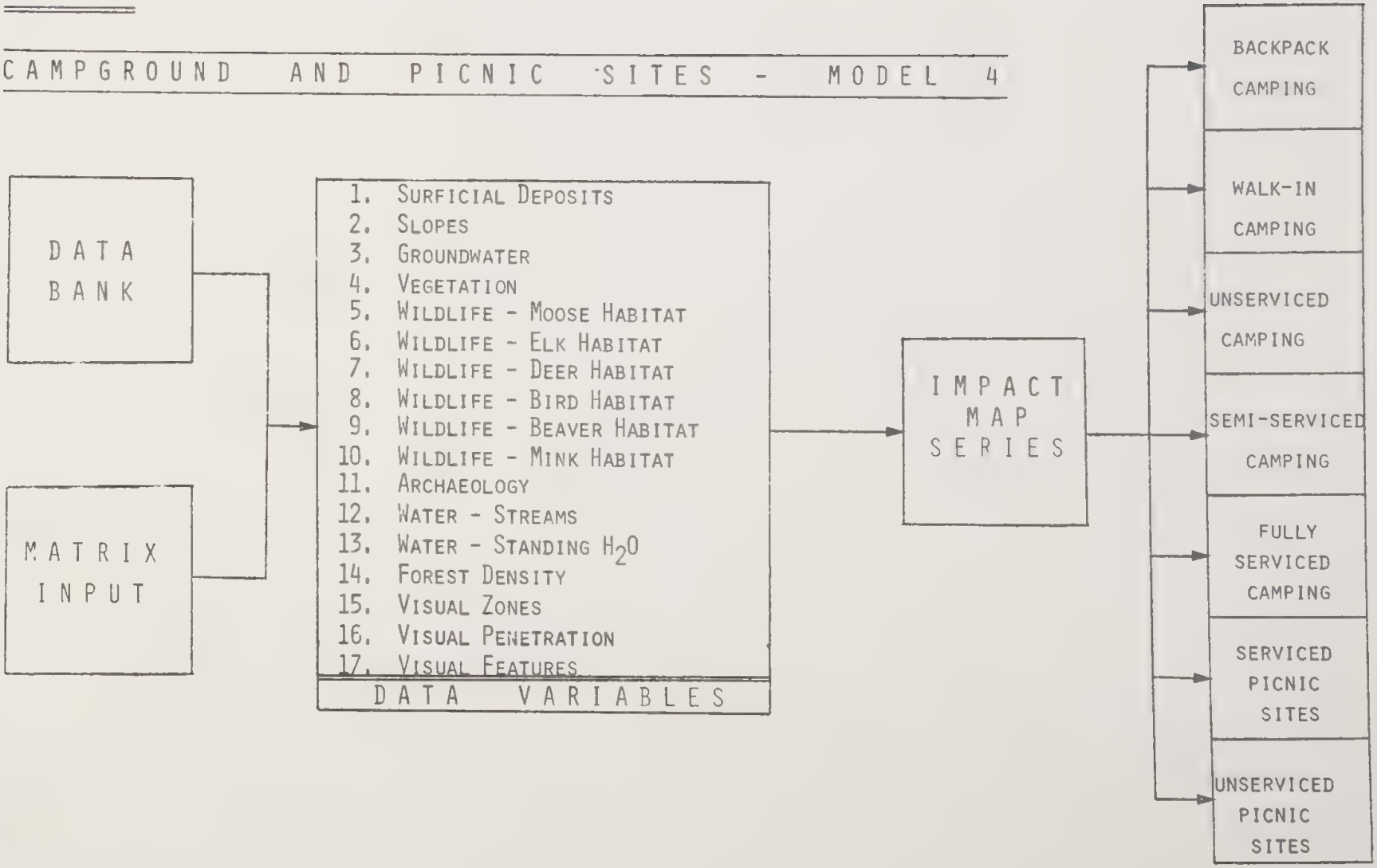
During the impact analysis phase our major concern was shifted to that of environmental quality conditions. The series of maps produced illustrates the relative environmental impacts for locating various uses within the Park. As was the case under suitability analysis, there are a set of resource features which have relevant matrix interactions for each facility or potential use (see Model 3 and Model 4). Weightings follow the same logic as that outlined in the section on Suitability Criteria. Again, maps were only generated for the major Park infrastructure. Matrices are given for a full range of uses, and the generation of maps for these uses can easily be accomplished.

In the case of impact mapping, the factor of incomplete data for those cells outside the Park boundary, tends to push the cells involved into the lighter levels of shading. Since this would indicate a low environmental impact for most uses, one must always keep this fact in mind when examining the impact maps. As pointed out under the suitability analysis, this factor does not affect the remainder of the area.

ROADS AND TRAILS - MODEL 3



CAMPGROUND AND PICNIC SITES - MODEL 4



	Hard Surface Road	Gravel Road	Earth Road	Surfaced Trail	Unsurfaced Trail
SURFICIAL DEPOSITS:					
Alluvium	7	7	7	5	5
Eroded Slope (wooded)	9	9	9	7	5
Colluvium & Alluvial Fan	7	7	7	5	5
Meltwater Channel Deposits	5	5	5	5	5
Outwash	5	5	5	5	5
Hummocky Moraine	7	5	5	5	5
Loess	5	7	9	5	7
Undifferentiated (veneer on bedrock)	5	5	5	5	5
SOILS:					
Fine/Organic	9	9	9	7	7
Fine	7	7	7	7	7
Medium	5	5	5	5	5
Coarse	3	3	3	3	3
SLOPES:					
0 to 2%	3	3	3	1	1
2 to 5%	5	5	5	3	3
5 to 10%	7	7	7	5	5
0-2 or 2-5 and 5-10 or .GT. 10	9	9	9	9	5
GROUNDWATER:					
Major Aquifer	5	5	5	3	3
Minor Aquifer	7	7	7	5	5
Major Recharge Area	5	5	5	5	5
Minor Recharge Area	5	5	5	5	5
VEGETATION:					
Aspen	5	5	5	5	5
Spruce	5	5	5	5	7
Pine	5	5	5	5	7
Mixed	5	5	5	5	7
Marsh/Wet Meadow	9	9	9	9	9
Valley Bottom Grass/Shrub	5	5	5	5	5

	Hard Surface Road	Gravel Road	Earth Road	Surfaced Trail	Unsurfaced Trail
Vegetation continued;					
Willow/Currant/Cow Parsnip	7	7	9	7	9
Willow/Sedge	9	9	9	9	9
Mixed Grassland	3	3	3	3	3
Fescue Grassland	3	3	3	3	3
Grassland/Shrubland	3	3	3	3	3
Shrubland	5	5	5	5	5
Aspen Groveland	5	5	5	5	5
WILDLIFE:					
Moose Winter Range	9	7	7	7	5
Elk Winter Range	9	7	7	7	5
Deer Winter Range	9	7	7	7	5
Raptor Nest Site	9	9	9	9	9
Grasshopper Sparrow Nest Site	9	9	9	9	9
Broad-winged Hawk Habitat	9	9	9	7	7
Pied-billed Grebe Habitat	9	9	9	7	7
MacGillivray's Warbler Habitat	9	9	9	7	7
Beaver Habitat	7	7	7	5	5
Mink Habitat	7	7	7	5	5
ARCHAEOLOGY:					
Major Sites	9	7	7	7	7
Minor Sites	9	7	7	7	7
STREAMS:					
Watershed A	7	9	9	7	7
Watershed B	7	9	9	7	7
Watershed C	7	9	9	7	7
Watershed D	7	9	9	7	7
Watershed E	7	9	9	7	7
Watershed F	7	9	9	7	7
Watershed G	7	9	9	7	7
Watershed H	7	9	9	7	7
Watershed I	7	9	9	7	7
Watershed J	7	9	9	7	7
Watershed K	7	9	9	7	7
Watershed L	7	9	9	7	7
Watershed M	7	9	9	7	7
Watershed N	7	9	9	7	7

	Hard Surface Road	Gravel Road	Earth Road	Surfaced Road	Unsurfaced Trail
FOREST DENSITY:					
Sparce	1	1	3	3	5
Moderate	1	3	3	5	7
Dense	1	3	5	7	9
Very Dense	3	5	7	9	9
VISUAL ZONES: (non-forest)					
Open Water	9	9	8	2	1
Marsh	9	9	8	2	q 1
Slopes w/ Grass or Shrubland	9	9	8	3	2
Valley Bottom w/ Grass or Shrubland	9	9	8	2	1
Plateau w/ Grass or Shrubland	8	8	6	1	1
Developed	1	1	1	1	1
(forest)					
Slopes w/ Aspen Groveland	9	9	8	2	1
Slopes w/ Deciduous	9	9	8	1	1
Slopes w/ Coniferous	9	9	8	1	1
Slopes w/ Mixed	9	9	8	1	1
Valley Bottom w/ Deciduous	8	7	6	1	1
Valley Bottom w/ Coniferous	8	7	6	1	1
Valley Bottom w/ Mixed	8	7	6	1	1
Plateau w/ Aspen Groveland	7	6	5	1	1
Plateau w/ Deciduous	7	6	5	1	1
Plateau w/ Coniferous	7	6	5	1	1
Plateau w/ Mixed	7	6	5	1	1
VISUAL PENETRATION:					
Very Low	6	6	6	1	1
Low	4	4	4	1	1
Moderate	6	6	6	1	1
High	8	8	8	2	2w
Very High	9	9	9	3	3
VISUAL FEATURES:					
.GT. 2 negative	1	1	1	1	1
2 negative	1	1	1	1	1
1 negative	1	1	1	1	1
None	5	5	5	3	3
1 positive	7	7	7	5	5
2 positive	8	8	8	6	6
.GT. 2 positive	9	9	9	7	7

	I. Backpack Camping	II. Walk-in Campground	III. Unserviced Campground	IV. Semi-serviced Campground	V. Fully Serviced Campground	Serviced Picnic Ground	Unserviced
SURFICIAL DEPOSITS:							
Alluvium	3	5	7	9	9	7	7
Eroded Slope (wooded)	3	3	7	9	9	9	9
Colluvium & Alluvial Fan	3	5	7	9	9	7	7
Meltwater Channel Deposits	1	3	3	3	3	3	3
Outwash	1	3	3	3	3	3	3
Hummocky Moraine	1	5	5	5	5	5	5
Loess	3	5	7	9	9	9	7
Undifferentiated (veneer on bedrock)	1	5	5	5	5	5	5
SOILS:							
Fine/Organic	3	7	9	9	9	9	9
Fine	3	5	7	7	7	7	7
Medium	3	5	5	5	5	5	5
Coarse	3	3	3	3	3	3	3
SLOPES:							
0 to 2%	1	3	5	7	9	7	5
2 to 5%	1	3	5	7	9	7	5
5 to 10%	1	3	5	7	9	7	5
.GT. 10%	3	5	9	9	9	9	9
0-2 or 2-5 and 5-10 or .GT. 10	5	9	9	9	9	9	9
GROUNDWATER:							
Major Aquifer	1	1	3	3	5	5	5
Minor Aquifer	1	1	3	3	7	5	5
Major Recharge Area	1	1	3	3	3	3	3
Minor Recharge Area	1	1	3	3	3	3	3
VEGETATION:							
Aspen	1	3	5	5	7	5	3
Spruce	1	5	7	7	7	7	5
Pine	1	5	7	7	7	7	5
Mixed	1	3	5	5	7	5	3
Marsh/Wet Meadow	3	7	7	9	9	9	7

Environmental Impact Assessment of Camping and Picnic Grounds continued

	I. Backpack Camping	II. Walk-in Campground	III. Unserviced Campground	IV. Semi-serviced Campground	V. Fully Serviced Campground	Serviced Picnic Ground	Unserviced
Vegetation continued;							
Valley Bottom Grass/Shrub	1	3	3	3	5	3	3
Willow/Currant/Cow Parsnip	3	5	7	7	9	7	7
Willow/Sedge	3	7	7	9	9	9	7
Mixed Grassland	1	3	3	3	5	5	3
Fescue Grassland	1	3	3	3	5	5	3
Grassland/Shrubland	1	3	3	3	5	5	3
Shrubland	1	5	5	5	7	5	5
Aspen Groveland	1	3	5	5	7	5	3
WILDLIFE:							
Moose Winter Range	1	3	5	5	7	5	5
Elk Winter Range	1	3	5	5	7	5	5
Deer Winter Range	1	2	5	5	7	5	5
Raptor Nest Site	7	9	9	9	9	9	9
Grasshopper Sparrow Nest Site	7	9	9	9	9	9	9
Broad-winged Hawk Habitat	7	9	9	9	9	9	9
Pied-billed Grebe Habitat	7	9	9	9	9	9	9
MacGillivray's Warbler Habitat	4	7	9	9	9	9	9
Beaver Habitat	5	7	7	7	7	7	7
Mink Habitat	5	7	7	7	7	7	7
ARCHAEOLOGY:							
Major Sites	5	7	7	7	7	7	7
Minor Sites	5	7	7	7	7	7	7
WATERBODIES:							
Major Water Body in Watershed G	1	3	5	5	5	5	5
Watershed I	1	5	7	9	9	9	9
Watershed J	1	5	7	7	7	7	7
STREAMS:							
Watershed A	1	5	7	9	9	9	9
Watershed B	1	5	7	9	9	9	9
Watershed C	1	5	7	9	9	9	9

	I. Backpack Camping	II. Walk-in Campground	III. Unserviced Campground	IV. Semi-serviced Campground	V. Fully Serviced Campground	Serviced Picnic Ground	Unserviced
Streams continued;							
Watershed D	1	5	7	9	9	9	9
Watershed E	1	5	7	9	9	9	9
Watershed F	1	5	7	9	9	9	9
Watershed G	1	5	7	9	9	9	9
Watershed H	1	5	7	9	9	9	9
Watershed I	1	5	7	9	9	9	9
Watershed J	1	5	7	9	9	9	9
Watershed K	1	5	7	9	9	9	9
Watershed L	1	5	7	9	9	9	9
Watershed M	1	7	7	9	9	9	9
Watershed N	1	7	9	9	9	9	9
FOREST DENSITY:							
Sparce	1	1	3	3	5	3	3
Moderate	1	3	3	5	7	3	3
Dense	1	3	5	7	9	5	5
Very Dense	3	5	7	9	9	7	7
VISUAL ZONES: (non-forest)							
Open Water	5	5	7	7	9	5	3
Marsh	6	6	8	8	9	6	5
Slopes w/ Grass or Shrubland	5	5	8	8	9	4	3
Valley Bottom w/ Grass or Shrubland	2	2	4	4	8	3	2
Plateau w/ Grass or Shrubland	4	4	5	5	7	2	1
Developed	1	1	2	2		1	1
(forest)							
Slopes w/ Aspen Groveland	6	6	7	7	9	6	5
Slopes w/ Deciduous	3	3	6	6	7	5	4
Slopes w/ Coniferous	3	3	6	6	7	5	4
Slopes w/ Mixed	3	3	6	6	7	5	4
Valley Bottom w/ Aspen Groveland	3	3	5	5	8	4	4
Valley Bottom w/ Deciduous	2	2	4	4	6	3	3
Valley Bottom w/ Coniferous	2	2	4	4	6	3	3
Valley Bottom w/ Mixed	2	2	4	4	6	3	3
Plateau w/ Aspen Groveland	2	2	4	4	7	3	3

	I. Backpack Camping	II. Walk-in Campground	III. Unserviced Campground	IV. Semi-serviced Campground	V. Fully Serviced Campground	Serviced Picnic Ground	Unserviced
Visual Zones continued;							
Plateau w/ Deciduous	2	2	3	3	5	2	3
Plateau w/ Coniferous	2	2	3	3	5	2	3
Plateau w/ Mixed	2	2	3	3	5	2	3
VISUAL PENETRATION:							
Very Low	1		1	1	2	1	1
Low	2		2	2	3	2	2
Moderate	3		3	3	4	2	2
High	5		4	4	6	3	3
Very High	6		5	5	7	4	4
VISUAL FEATURES:							
.GT. 2 negative	1		1	1	1	1	1
2 negative	1		1	1	1	1	1
1 negative	1		1	1	1	1	1
None	3		5	5	5	5	3
1 positive	4		6	6	8	7	5
2 positive	5		7	7	9	8	6
.GT. 2 positive	6		8	8	9	9	7

	Boating (Sail)	Boating (Canoes, etc.)	Boating (High Power)	Boating (Low Power)	Fishing (Improved)	Fishing (Unimproved)	Water Skiing	Swimming
SOILS:								
Fine/Organic	7	5	7	7	7	5	7	7
Fine	7	5	7	7	7	5	7	7
Medium	5	3	5	3	5	3	5	5
Coarse	3	1	3	1	3	1	3	3
VEGETATION:								
Marsh/Wet Meadow	5	3	7	7	5	3	7	5
WILDLIFE:								
Pied-billed Grebe Habitat	5	7	9	9	7	5	7	5
Beaver Habitat	3	5	7	7	5	3	1	1
WATERBODIES:								
Major Water Body in Watershed G	3	3	7	5	5	3	5	3
Watershed I		5	9	9	7	5		3
Watershed J		5	9	7	7	5	9	3
STREAMS:								
Watershed A						5		
Watershed B						5		
Watershed C						5		
Watershed D						5		
Watershed E						5		
Watershed F					7	5		
Watershed G						5		
Watershed H						5		
Watershed I						5		
Watershed J					7	5		
Watershed K						5		
Watershed L					7	5		
Watershed M					7	5		
Watershed N					7	5		

	Boating (Sail)	Boating (Canoes, etc.)	Boating (High Power)	Boating (Low Power)	Fishing (Improved)	Fishing (Unimproved)	Water Skiing	Swimming	Ice Skating
VISUAL ZONES: (non-forest)									
Open Water	3	3	9	8	7	1	9	1	1
Marsh	7	5	9	9	7	3	9	5	1
Slopes w/ Grass or Shrubland	3	1	9	8	7	1	9	1	1
Valley Bottom w/ Grass or Shrubland	3	3	9	7	7	1	9	1	1
Plateau w/ Grass or Shrubland	3	3	9	7	7	1	9	1	1
Developed	1	1	5	3	1	1	5	1	1
(forest)									
Slopes w/ Aspen Groveland	3	3	9	8	7	1	9	1	1
Slopes w/ Deciduous	3	3	9	8	7	1	9	1	1
Slopes w/ Coniferous	3	3	9	8	7	1	9	1	1
Slopes w/ Mixed	3	3	9	8	7	1	9	1	1
Valley Bottom w/ Aspen Groveland	1	1	9	8	7	1	9	1	1
Valley Bottom w/ Deciduous	1	1	9	8	7	1	9	1	1
Valley Bottom w/ Coniferous	1	1	9	8	7	1	9	1	1
Valley Bottom w/ Mixed	1	1	9	8	7	1	9	1	1
Plateau w/ Aspen Groveland					5	1			1
Plateau w/ Deciduous					5	1			1
Plateau w/ Coniferous					5	1			1
Plateau w/ Mixed					5	1			1
VISUAL PENETRATION:									
Very Low	1	1	7	5	1	1	7	1	1
Low	1	1	8	7	1	1	8	1	1
Moderate	1	1	9	8	3	1	9	1	1
High	1	3	9	8	5	1	9	1	1
Very High	1	3	9	8	7	1	9	1	1
VISUAL FEATURES:									
.GT. 2 negative	1	1	1	1	1	1	1	1	1
2 negative	1	1	1	1	1	1	1	1	1
1 negative	1	1	1	1	1	1	1	1	1
None	1	1	7	5	3	1	7	1	1
1 positive	1	3	9	8	5	1	9	1	1
2 positive	3	3	9	9	6	2	9	3	3
.GT. 2 positive	3	3	9	9	7	3	9	5	5

	Hiking	Bicyling	Horesback Riding	Cross Country Skiing	Motor Touring (Driving)	Nature Observation	Nature Photography	Down Hill Skiing	Ice Skating
SURFICIAL DEPOSITS:									
Alluvium	5	5	5		7				
Eroded Slope (wooded)	5	5	7		7				
Meltwater Channel Deposits	1	1	3		5				
Outwash	1	1	3		5				
Hummocky Moraine	1	1	3		5				
Loess	5	5	7		7				
Undifferentiated (veneer on bedrock)	1	1	3		5				
SOILS:									
Fine/Organic	7	7	9		9				
Fine	5	5	7		7				
Medium	3	3	5		5				
Coarse	1	1	3		3				
GROUNDWATER:									
Major Aquifer	1	1	1		5				
Minor Aquifer	1	1	1		5				
Major Recharge Area	1	1	1		5				
Minor Recharge Area	1	1	1		5				
VEGETATION:									
Aspen				3	5	1	1	1	
Spruce				3	5	1	1	7	
Pine				3	5	1	1	7	
Mixed				3	5	5	5	7	
Marsh/Wet Meadow				3	5	1	1	1	
Valley Bottom Grass/Shrub				3	5	1	1	1	
Willow/Currant/Cow Parsnip				3	5	3	3	1	
Willow/Sedge				3	5	5	5	1	
Mixed Grassland				1	5	1	1	1	
Fescue Grassland				1	5	1	1	1	
Grassland/Shrubland				1	5	1	1	1	
Shrubland				3	5	1	1	1	
Aspen Groveland				3	5	1	1	3	

Environmental Impact Assessment of Various Recreation Uses continued

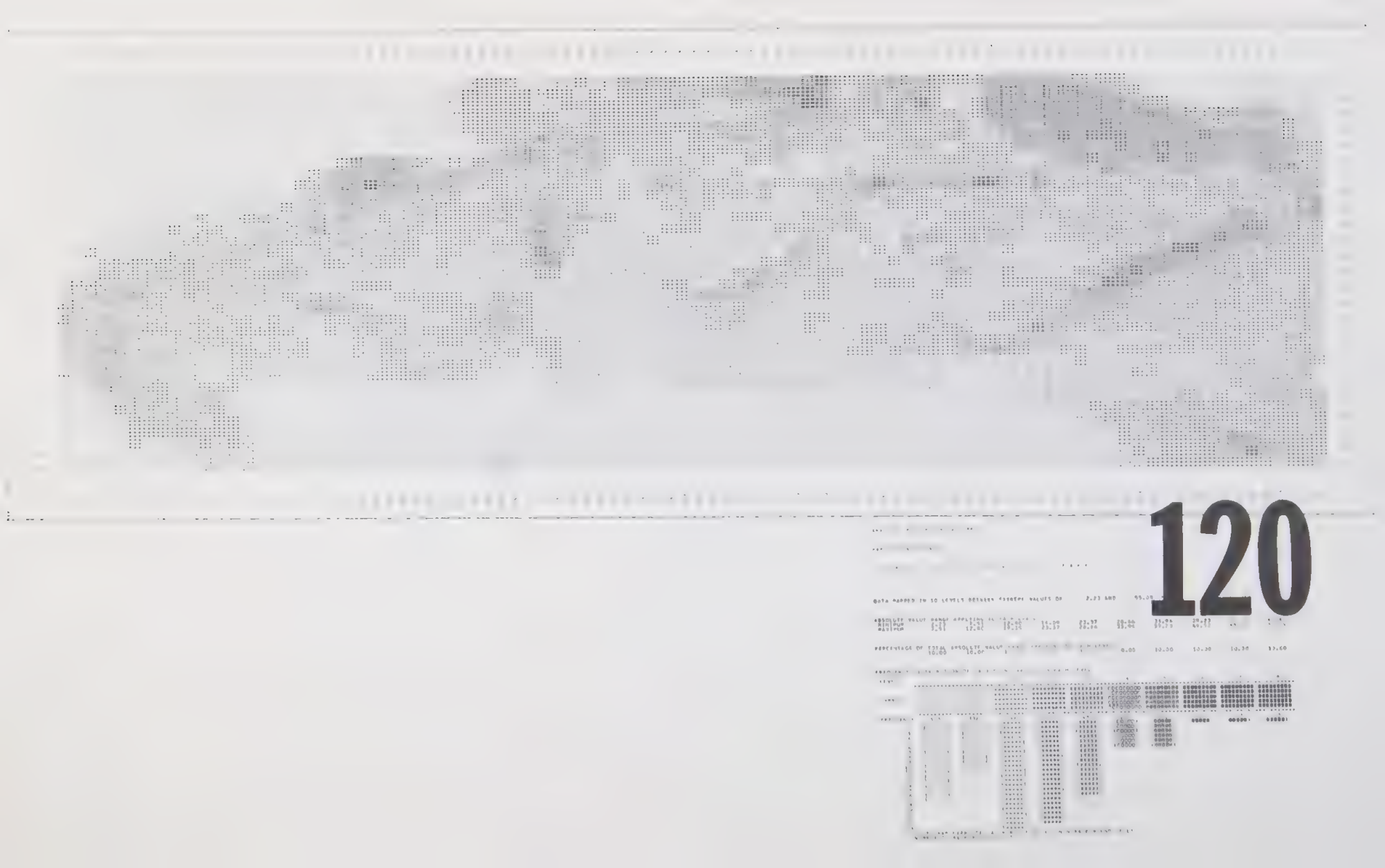
	Hiking	Bicyling	Horesback Riding	Cross Country Skiing	Motor Touring (Driving)	Nature Observation	Nature Photography	Down Hill Skiing	Ice Skating
WILDLIFE:									
Moose Winter Range	3	3	3	7	5	7	7	7	
Elk Winter Range	3	3	3	7	5	7	7	7	
Deer Winter Range	3	3	3	7	5	7	7	7	
Raptor Nest Site	9	9	9	1	7	7	7	1	
Grasshopper Sparrow Nest Site	9	9	9	1	7	7	7	1	
Broad-winged Hawk Habitat	7	7	7	1	7	5	5	5	
Pied-billed Grebe Habitat	5	5	5	3	5	5	5		5
MacGillivray's Warbler Habitat	7	7	7	1	7	5	5		
Beaver Habitat	5	5	5	1	5	5	5		
Mink Habitat	5	5	5	1	5	5	5		
ARCHAEOLOGY:									
Major Sites	7	7	7	1	7				
Minor Sites	7	7	7	1	7				
WATERBODIES:									
Major water body in Watershed G	3	3	7	1	3	1	1		1
Watershed I	5	7	9	1	3	1	1		1
Watershed J	5	7	9	1	3	1	1		1
STREAMS:									
Watershed A	5	7	9	1	3	3	3		
Watershed B	5	7	9	1	5	3	3		
Watershed C	5	7	9	1	5	3	3		
Watershed D	5	7	9	1	5	3	3		
Watershed E	5	7	9	1	5	3	3		
Watershed F	5	7	9	1	5	3	3		
Watershed G	5	7	9	1	5	3	3		
Watershed H	5	7	9	1	5	3	3		
Watershed I	5	7	9	1	5	3	3		
Watershed J	5	7	9	1	5	3	3		
Watershed K	5	7	9	1	5	3	3		
Watershed L	5	7	9	1	5	3	3		
Watershed M	5	7	9	1	5	3	3		
Watershed N	5	7	9	1	5	3	3		

	Hiking	Bicyling	Horesback Riding	Cross Country Skiing	Motor Touring (Driving)	Nature Observation	Nature Photography	Down Hill Skiing	Ice Skating
VISUAL ZONES: (non-forest)									
Open Water	1	3	2	2	9	1		5	1
Marsh	2	3	2	2	9	1		7	1
Slopes w/ Grass or Shrubland	2	4	3	3	9	1		3	
Valley Bottom w/ Grass or Shrubland	1	3	2	2	8	1			
Plateau w/ Grass or Shrubland	1	3	2	2	8	1			1
Developed	1	1	1	1	5	1		1	1
(forest)									
Slopes w/ Aspen Groveland	1	3	2	1	9	1		5	
Slopes w/ Deciduous	1	3	2	1	9	1		5	
Slopes w/ Coniferous	1	3	2	1	9	1		5	
Slopes w/ Mixed	1	3	2	1	9	1		5	
Valley Bottom w/ Aspen Groveland	1	3	2	1	8	1			1
Valley Bottom w/ Deciduous	1	3	2	1	8	1			1
Valley Bottom w/ Coniferous	1	3	2	1	8	1			1
Valley Bottom w/ Mixed	1	3	2	1	8	1			1
Plateau w/ Aspen Groveland	1	3	2	1	8	1			1
Plateau w/ Deciduous	1	3	2	1	8	1			1
Plateau w/ Coniferous	1	3	2	1	8	1			1
Plateau w/ Mixed	1	3	2	1	8	1			1
VISUAL PENETRATION:									
Very Low	1	2	1	1	8	1		1	1
Low	1	2	1	1	8	1		1	1
Moderate	1	2	1	1	9	1		3	1
High	1	2	2	1	9	1		5	1
Very High	1	3	3	1	9	1		6	1
VISUAL FEATURES:									
.GT. 2 negative	1	1	1	1	1	1		1	1
2 negative	1	1	1	1	1	1		1	1
1 negative	1	1	1	1	1	1		1	1
None	1	2	1	1	8	1		3	1
1 positive	1	2	1	1	9	1		5	1
2 positive	2	3	2	2	9	1		6	1
.GT. 2 positive	3	4	3	3	9	2		7	3

IMPACT - Relative Weighting of Categories

1 most heavily weighted ---------- 4 least heavily weighted

	Roads and Trails	Campgrounds and Picnics	Water Orient Fishing Skating	Water Orient Boating Swimming	Various Hiking Horseback Bicycling	Various Motor Touring	Various Skiing- Down Hill Cross Country	Various Nature Photographs Nature Observation
Surficial Geology	2	2						
Slopes	2	2						
Groundwater	4	4						
Vegetation	2	2		2	2	2	2	2
Wildlife	1	1		1	1	1	2	1
Archaeology	1	1			2			2
Slope Orientation	4	4	4	4				
Park Roads	4	2	3					
Park Facilities	4							
Major Water Body		2	1	1	3	3		4
Minor Water Body		1	2	4	3	3		3
Stream		1	1	5	2	3		2
Forest Height	4							
Forest Density	5	5						
Visual	4	4	3	3	1			4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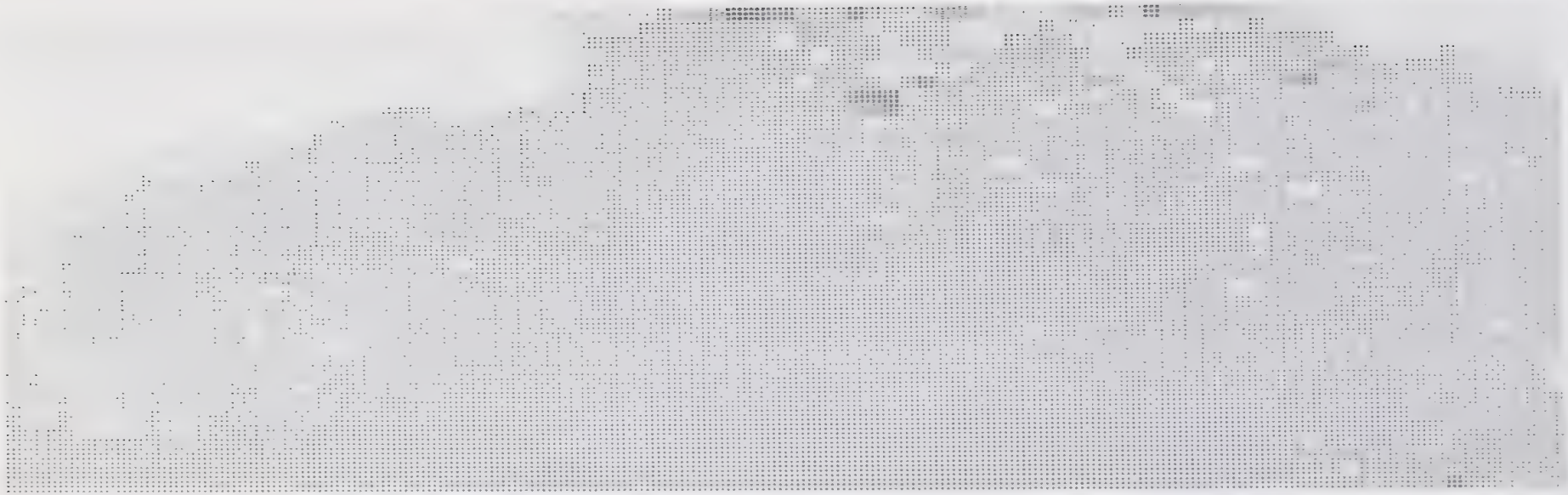

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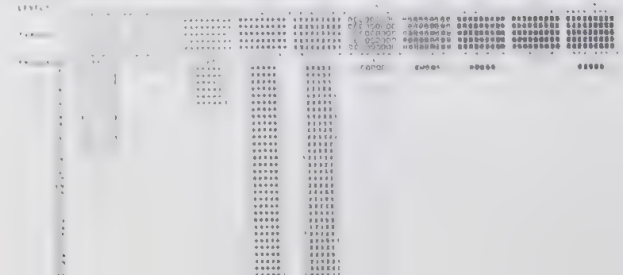

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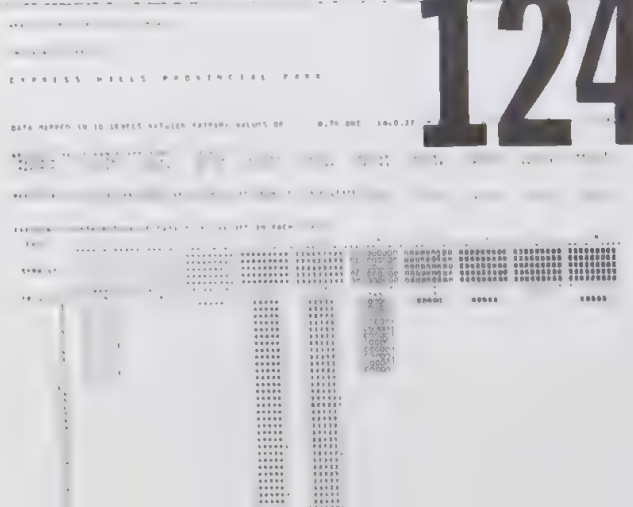

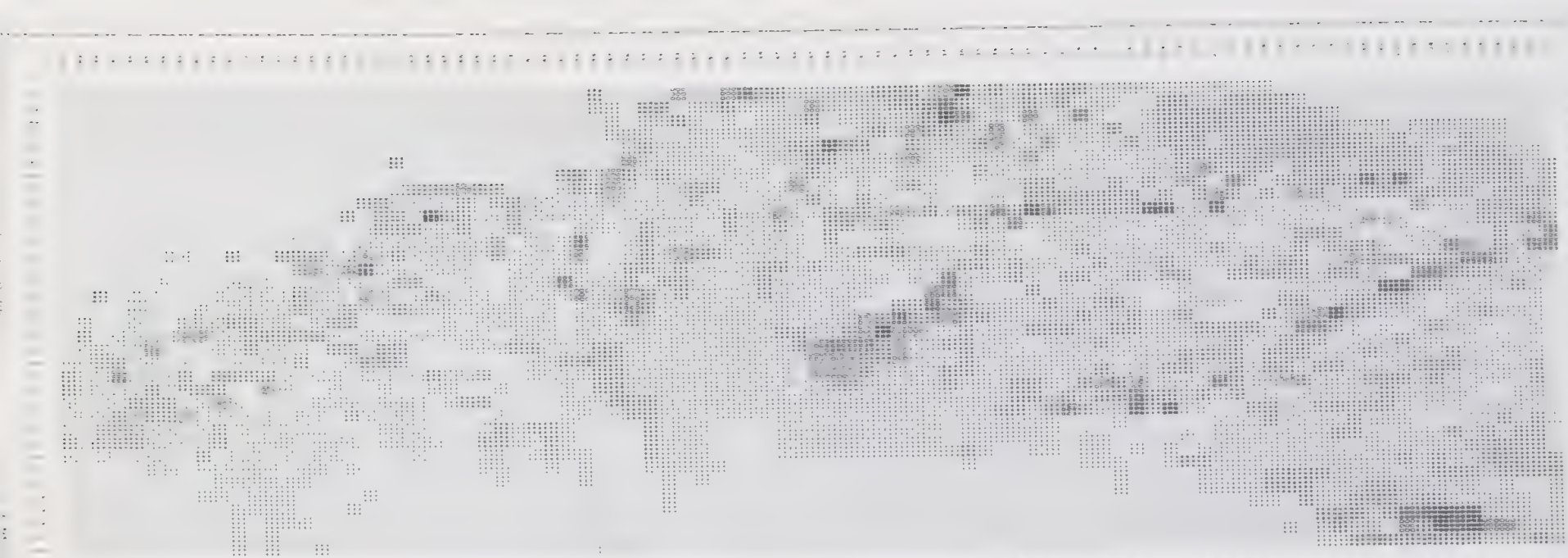

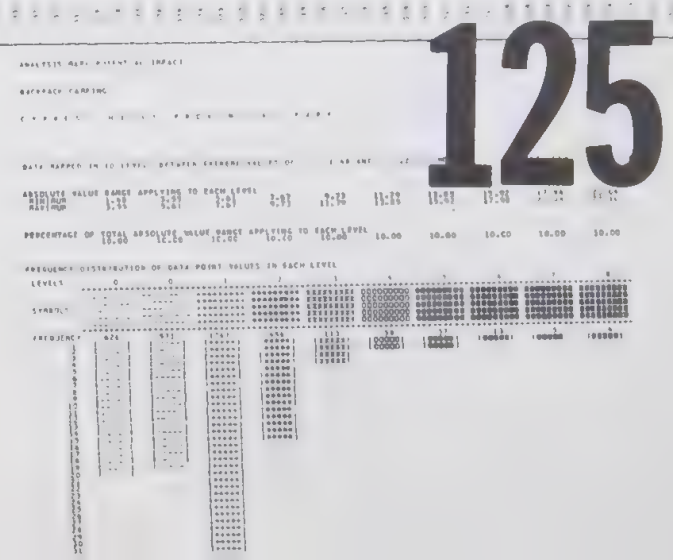

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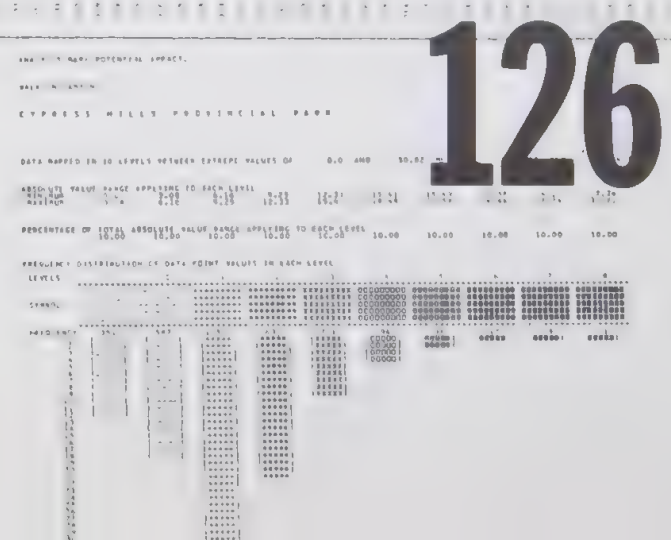
EYPRESS MILLS PROVINCIAL PARK
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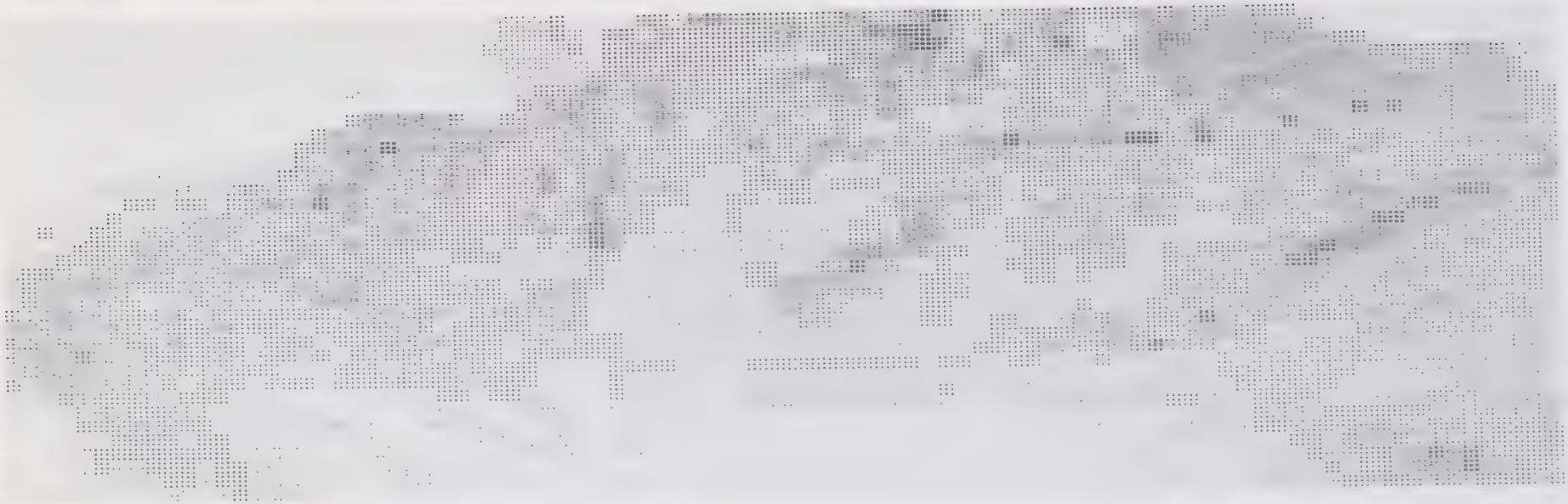
PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLICABLE TO EACH LEVEL
10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL
LEVELS



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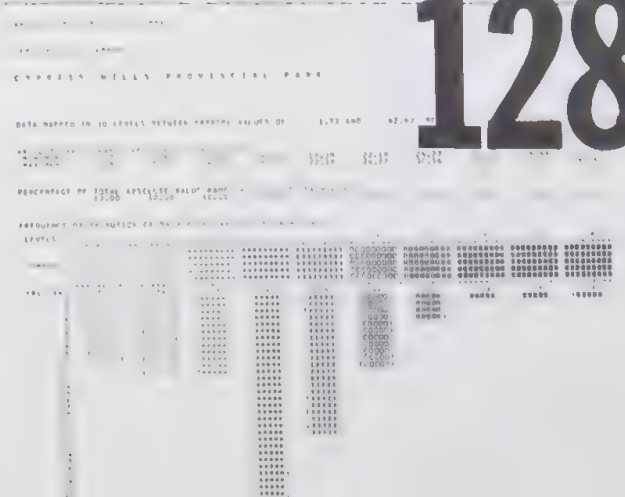

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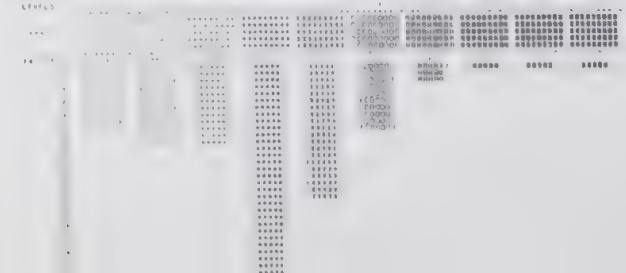

131

FACILITIES EVALUATION

FACILITIES EVALUATION

The major facilities of the Park were evaluated by comparing the location of the facility with the suitability and impact shading maps. These evaluations are intended to give an indication of, firstly, whether present facilities are located in suitable areas, and secondly whether they are located in high impact areas, that is areas in which they are adversely or might be adversely affecting the quality of the environment. This analysis is very general and specific problem areas must necessarily be examined in more detail in later planning stages. In order to appreciate why a facility was described as either unsuitably located or located in a high impact area, it is necessary to examine the matrices presented in the preceeding section which display the variables used and their relative weightings.

SUITABILITY OF EXISTING FACILITIES

Hard Surface Roads

Highway 48

For much of the highway's length inside the park it appears to be located on highly unsuitable terrain (see suitability matrix). The unsuitable areas are in sections 18 and 19 (T. 8 RGE 2). The remainder of the highway in the park appears to be fairly suitably located.

Reesor Lake Road

With the exception of a few locations in sections 25 (T. 8 RGE 2) and 30 (T. 8 RGE 1) this road appears to be fairly suitably located.

Ferguson Hill Road

The portion of Ferguson Hill Road occurring in Section 24 (T. 8 RGE 2) is located in a highly unsuitable area for roads. In sections 13 and 14 the unsuitable conditions are somewhat less severe.

Murray Hill Road

The paved portion of this road from the junction of highway 48 to the top of the plateau appears to be suitably located.

Earth or Gravel Roads

From an environmental point of view the gravel or earth roads which are located in highly unsuitable areas are:

Battle Creek Road - Section 22 and 23 (T. 8 RGE 1)

Graburn Creek Road - Sections 13 and 14 (T. 8 RGE 1)

Murray Hill Road - Section 6 (T. 8 RGE 3)

Trails

Although numerous informal trails exist the only major formal trails appear to be the Beaver Creek Trail and the trail from the east end of Elkwater Lake to Spruce Coulee. At a very general level both trails appear to pass through suitable areas. (Small areas unsuitable terrain may exist, but these can be determined only be detailed on-site analysis.)

Campgrounds

Fully Serviced

Two campgrounds in this category are located in Cypress Hills Park. These are Beaver Creek and Elkwater which are immediately west of Elkwater townsite. Both these campgrounds appear to be located in suitable areas although by no means the most suitable areas in the park.

Semi-Serviced

Both Ferguson Hill and Lodgepole Campgrounds appear to be sited in moderately suitable areas.

Reesor Lake Campground straddles two areas of different suitability characteristics, the east portion is moderately suitable while the west portion is moderately unsuitable.

Nichol Springs Campground appears to be located in a moderately suitable location.

It should be pointed out that none of the semi-serviced campgrounds are located in the most suitable locations in the Park.

Unserviced

Three campgrounds, Spruce Coulee, Battle Creek and Graburn are considered under this category.

Both Spruce Coulee and Battle Creek Campgrounds are situated in areas which are generally highly suitable for unserviced campgrounds. (The specific locations may however have some unsuitable qualities.)

Graburn Creek Campground appears to be situated in an area which is classed as moderately unsuitable for campground development.

POTENTIAL IMPACT OF EXISTING FACILITIES

Hard Surface Roads

Highway 48

The highway passes through moderately high to high impact areas in sections 19, 18, and 7 (T. 8 RGE 3). For the remainder of its length in the Park it is in low impact areas.

Reesor Lake Road

For most of its length Reesor Lake Road is in low impact areas. The exception is Section 30 (T. 8 RGE 1) where it skirts a potentially high impact area.

Ferguson Hill Road

A short section of Ferguson Hill Road crosses a high impact area in Section 24 (T. 8 RGE 3). For the remainder of its length it passes through relatively low impact areas.

Murray Hill Road

For most of its length from the junction with 48 to Section 5, Murray Hill Road is located in moderately low impact areas. However, in the East part of Section 5 and West part of Section 6 (as yet unpaved) it passes through moderate to moderately high impact areas.

Spruce Coulee Road

Spruce Coulee Road passes through low to moderate to moderately high impact areas from its junction with Reesor Lake Road to the Park Boundary. The road down to Spruce Coulee Reservoir passes through high impact areas.

Earth and Gravel Roads

The majority of the earth or gravel roads in Cypress Hill Park fall into the moderate to moderately low impact category.

A notable exception was a portion of Battle Creek Road (Section 22, T. 8 RGE 1) east of Reesor Lake; a high potential impact area.

Trails

The two formal trails (Beaver Creek and the trail from Elkwater Lake to Spruce Coulee) are generally located in low impact areas for this type of use.

Campgrounds

Fully Serviced

Both Beaver Creek and Elkwater Campgrounds are located in an area of moderate potential impact. Areas to the east of these are generally low impact areas while the area west are high impact zones.

Semi-Serviced

Both Ferguson Hill and Lodgepole Campgrounds are located in moderate impact areas.

Nichol Springs Campground is situated in a region in which the potential impact varies from a moderate to moderately high.

Battle Creek Campground is situated in a moderate impact zone but has several high impact areas adjacent to it.

Unserviced Campgrounds

Spruce Coulee Campground is located in a high impact area. In fact much of Section 26 (T. 8 RGE 2) is classed as a high potential impact area.

Graburn Creek Campground is also located in an area of potentially high impact.

APPENDIX 1

APPENDIX I

The digitizer, or graphic to digital converter, is a device which is made up of three main components: the digitizer plotting table, the electronic console, and optional output device; in our case a standard keypunch.

The digitizer plotting table consists of a conventional pedestal-mounted board which is adjustable for height and slope. A hand-held cursor incorporates a coil which senses an electrically generated signal. A generating coil, located below the table and attached to a mechanical gantry homes in on the cursor as it moves, coming to rest immediately under the cursor. The movement is accomplished by electromagnetic servo-mechanisms which move the generating coil in the X and Y axes, as required. Signals are fed to the electronic console, which visually displays a numerical values of the position. Therefore, as the cursor is moved, the numerical values change rapidly so that the co-ordinate values are displayed. At any location, the X and Y co-ordinates which are displayed on the visual read-out can be recorded permanently by actuating a switch on the cursor. The cursor is linked to a keypunch unit through the electronic console, and by this means co-ordinates may be recorded on computer cards. The digitizer is capable of recording to an accuracy of 0.001 of an inch.

By this method the co-ordinate location of the cursor can be directly recorded on cards. Thus for any irregular shaped areas, a sequential series of co-ordinate locations will describe that shape in terms of short straight-line segments. Once all the outlines of the various data patterns were described using the digitizer, the "real" (as opposed to coded) data collected was assembled into a card file. This card file of "real" data then becomes the source of input to the GRID/Merge program, which in turn generates, as output, the gridded and coded data bank required as input to GRID program.

The employment of a co-ordinate digitizer for data compilation proved to be an extraordinary time-saving method. Hand coding and keypunching would have required hundreds of man-hours, whereas using the digitizing approach the job was completed in less than 50 hours.